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OBSERVATIONS

ON THE

VENEREAL DISEASE

IN PORTUGAL,

AS AFFECTING THE CONSTITUTIONS OF

THE BRITISH SOLDIERY AND NATIVES.

By Wm. FERGUSSON, Esq.
INSPECTOR GENERAL OF HOSPITALS TO THE PORTUGUESE ARMY.

Read June 9, 1812.

Evora, April 30, 1812.

SYPHILIS has excited much interest and attention in this country on the part of all British medical observers; no less from its dreadful ravages amongst their own countrymen, than from its comparatively milder phænomena amongst the inhabitants of the country. In the British army, it is probable, that more men have sustained the most melancholy of all mutilations, during the four years that it has been in Portugal, through this disease, than the registers of all the hospitals in England could produce for the last century; while venereal ulceration has not only been more intractable to the operation of mercury than under similar circumstances at home, but the constitution, while

strongly under the influence of the remedy, has become affected with the secondary symptoms in a proportion that could not have been expected. With the natives, on the contrary, the disease is very mild; curable, for the most part, by topical treatment alone, or wearing itself out, when received into the constitution, after running a certain course (not always a very destructive one) without the use of any adequate mercurial remedy.—This is seldom confessed by the practitioners of the country, who deeply feel and resent the ridicule that has been cast upon them by foreigners, as much for the prevalence of the disease as their supposed ignorance in treating it; and, therefore, they generally profess themselves to be advocates for mercury, and adepts in its use; but the fact is not so, and I can aver that the bulk of the people, and of all the military at the hospitals, even though a general order has been given out enjoining the use of mercury, cure themselves, or get cured, by other means.—I have now been upwards of two years at the head of their hospital department, and I can declare, that it never occurred to me, amongst all the venereal patients whom in that time I have seen pass through the hospitals, to meet a single one under the influence of mercury, excepting those cases wherein I myself have personally superintended its administration. They go out cured by topical remedies alone; and I have lived long enough amongst them to ascertain, that their return to hospital under such circumstances for secondary

symptoms, is far from an universal, or even a frequent occurrence. To make this understood, I shall take the case before me, as verified this day by myself and staff surgeon Jebb, and exhibit the state of the disease at the hospital from whence I now write. The venereal list amounts to forty-six; they had all been several weeks in the hospital previous to my arrival, and two of them only were taking mercury, in an alterative form, for a supposed affection of the bones; the rest being only primarily affected with ulcers and buboes, or secondarily with ulcers in the throat, were, with only one exception, doing perfectly well from topical remedies alone; quite as well, certainly, as an equal number of patients, under the most favourable circumstances of a mercurial course for an equal number of weeks, could be supposed to do in an English hospital: and all will soon be discharged apparently cured, without having had further recourse to any mercurial remedy, unless my longer residence here enables me to enforce its use. I ought here to explain, that none of the ulcers are such trifling cases of chancre as we have seen at home, which can often be dried up with a piece of lint; nor even such as an English soldier would run with in affright to seek the succour of his surgeon. To these the Portuguese soldier pays no attention whatever; he does not consider them to be a hindrance to him in any manner, and I have seen him turn out for duty with ulcers that made me shudder to look at, though both he and his medical

attendant considered them as nothing;—but they are large extensive ulcerations (for which two of them have suffered amputation of the prepuce) that must have incommoded him in walking, and caused great inconvenience previous to his being taken into the hospital.

In the military hospitals I know that the cure for primary symptoms is generally trusted to topical remedies; but in private practice, I believe, it is common to combine with them the use of the antisyphilitic woods in decoction; reserving the use of mercury as above, till the disease shews itself in the last order of parts, its last citadel, the bones, when a ridiculously insignificant quantity of mercury, generally of calomel, along with Dover's powder, guaiacum, warm baths, and other sudorifics, is given to complete the cure. Dreadful examples of exfoliation and loss of parts, no doubt, sometimes occur; but these, though they powerfully impress the feelings of strangers, by appearing without scruple in the streets of great towns, and in the ordinary concerns of life, by no means constitute a large proportion of the affected; on the contrary, the affection of the bones is often so slight, that, were it not that it could be traced through the preceding stages, and that the nocturnal paroxysm of pain is distinctly marked, it might be classed, treated, and cured as rheumatism, with sudorifics alone. Its appearance in the throat, where it shews itself when the constitution is tainted, according to the

same rule that it does with us, excites no greater alarm than when it is confined to the first order of parts. They consider it as an insignificant local disease, and, waiting for the grand symptoms in the bones, attack it topically with mercurial apozems, or stimulating mercurial gargles, and often actually dislodge it with the same facility that they cure original chancres.

The above is a true outline of the history and treatment of this disease as it occurs amongst the soldiery, consequently amongst the peasantry and bulk of the inhabitants of Portugal. I long doubted the facts, but now am convinced of their reality; and, from them all, there would appear to result the following conclusions:

1. That the disease, in its primary state, is curable in Portugal without mercury.

2. That the antisyphilitic woods, combined with sudorifics, are an adequate remedy for constitutional symptoms; the quantity of mercury being always insignificant, and often altogether omitted; or,

3. That the virulence of the disease has become so much mitigated by reason of general and inadequately resisted diffusion, or other causes, that, after running a certain (commonly a mild) course, through the respective orders of parts, according to the known laws of its progress, it exhausts itself, and ceases spontaneously.

If this last be true, which to a certain degree I believe that it is, then may sarsaparilla, or any thing else, obtain fame as a remedy; but, at the same time, it ought to be acknowledged, that the best informed natives of, or travellers to, the Brazils, bear witness to the undoubted efficacy of the anti-syphilitic woods in that country, where their reputation has ever stood on high grounds; and though in England they have been proved to be utterly inefficacious as a remedy, being nothing more than an humble adjuvant of mercury, yet in Portugal, I believe, from their past services, they have merited a better character. There, it is probable, their efficacy may not be equal to that which results from their exhibition in tropical latitudes; but their high character, particularly at Lisbon, under the form of the Lisbon Diet Drink, for ages past, when the disease could not be considered as being in the exhausted state I am now attempting to prove, shews that they must have possessed powers, which, though not to be compared with their established virtues in the Brazils, were far more striking than any good that has ever been derived from their exhibition in England, or the other colder climates of Europe. That the disease is now curable here in its first stages, without either mercury or sarsaparilla is unquestionable, as well from the thousands of actual cures, as from the certainty that the use of mercury, when pushed to the extent that can at all constitute it a remedy in any stage, is actually

unknown to the native practitioners, who, in that point of view, religiously abstain from its use, considering it with horror as one of the poisons which foreigners madly wield; and, therefore, I would infer, that the disease is exhausted, and has expended much of its virulence, in this country *, as much from its easy cure, as from the analogy of the natural small pox, which, though the uses of inoculation and vaccination are well known to their regular faculty, has been permitted, through the

* That the disease has exhausted itself in other countries as well as Portugal, and for the same reasons, may be inferred from the following circumstances: In the German regiments of our service, some medical officers have pertinaciously, even officially, refused to prescribe mercury; asserting that it was not necessary to the cure. Such alarming conduct, as being referable only to the most brutal ignorance, of course met with no quarter; but I have now no doubt, from what I have seen here, that in the districts of their own country where they were bred, the disease, from being allowed to run its course unresisted by mercury, probably for ages, had become as weak as the syphilis of Portugal; and their experience had never opened to them a more extensive field. Another fact, which at the time I could not comprehend, would appear to corroborate this. The venereal disease, in some districts of the Russian empire, prevails to a shocking degree amongst the peasantry, for which they use nostrums and remedies from the vegetable kingdom. It happened to me to visit the ancient capital of Moscow, during the year of the peace of Amiens, at the time when the Prince Gallitzin was choosing a surgeon to an hospital he had just endowed for the reception of syphilitic patients. The contest ran high between the advocates for, and opposers of, mercury, and the Prince did me the honour to consult me on the occasion.

prejudices of the people and defect of public spirit and public institutions, to run its natural course unresisted amongst the bulk of the inhabitants, and has been attended with effects not dissimilar. During my manifold examinations of the soldiery, I never could discover that they knew what inoculation meant, nor detect a single person bearing the marks of it. Many have suffered the natural small pox in the military hospitals, from the contagion of which they took no pains to preserve themselves, nor did the very smallest ever appear to be taken by their military and medical directors, who always seemed to consider my interference to that effect as both unreasonable and tyrannical.

I generally found such patients lying amongst other sick in hospital, without any regard to whether their neighbours had had the small pox or not, using the same diet as the rest, and taking the same remedies. They had, in fact, that kind of mild disease, which could not fail to do well under any kind of treatment; and I do not recollect a single case terminating fatally. Yet I have no doubt that were this mild disease, or the mildest that was ever produced from the improved inoculation of England, communicated to a tribe of Indians, or to a plantation of negroes, or any other class of people, who had never before known the small pox, it would desolate with all the fury of pestilence, destroying wherever it could find vic-

tions, and never ceasing till it had destroyed the whole.

All adventitious diseases, whether chronic or acute, all, in fact, that are not connate, endemic, and sporadic, appear more or less to run this course of exhausting themselves, while retained upon the same ground to which they have been transplanted; but let the field be changed in any degree, and fresh sources of developement be presented, they instantly resume their primary powers, and taking a fresh departure of violence, repeat the almost forgotten inflictions of their original visitation. The powers, which they thus acquire, bear some resemblance to a phænomenon which is every where observable in the vegetable kingdom amongst the operations of agriculture; where the same species of seed may be sown upon the same ground, until it shall so degenerate in point of vigour, as to become almost incapable of re-producing itself; but let it be changed to any other of any kind, though even of far inferior quality, it will immediately display new powers of life, and fructify and vegetate with its native strength. Similar to the above appears to be the inoculation of the exhausted syphilitic virus of Portugal, (though evidently the same disease,) into the constitution of the British or other stranger. It is in some measure new, therefore unfriendly; and seems to have the power of exciting new actions of more than ordinary violence, and requiring curative

means of more than common efficacy to arrest its progress. I need scarcely say, that this new organization of disease in the stranger, cannot be combated by such means as the natives employ to cure themselves. They would be utterly insignificant, and until some more potent antisyphilitic be discovered, mercury offers the only chance of salvation. To pretend to arrest it with vegetable remedies, would be as idle as to trust the cure of acute pneumonia to ptisans, or hepatitis to barley water.

Besides this new inoculation, however, I would say, that there is another cause for the extraordinary action of the venereal virus of Portugal, on the constitutions of strangers, originating out of peculiar circumstances of bodily condition. It is certain, that all changes of climate from a cold to a warmer temperature, predispose the human frame to febrile affections, or other forms of acute disease; and that the English, from their mode of life, always incautious, and frequently intemperate, are exposed, in a particular manner, to suffer from this predisposition.

They, less than any other nation, escape what is called the seasoning fever of warm climates, or an attack of the acute endemics of the country, whatever they may be; and if, previous to this attack, with their constitutions on the point of exploding into the acute forms of fever or dysentery, they

should have the misfortune to be affected with venereal ulceration, the elements of the disease, which had previously been prepared within their bodies, and would have manifested themselves in a general constitutional affection, at a given period, according to their own laws, are diverted by this casualty into new channels, and make their exit as a local form of fever in the shape of phagedænic ulceration.

To make this understood, I shall endeavour to illustrate it by a short case. Shortly after the battle of Vimeira, while making an inspection of the cantonments near Lisbon, I was called to by an officer a friend of mine, who earnestly implored my assistance. I found him four days after a connection in Lisbon, with the whole penis enormously swelled, of a deep red colour; malignant ugly chancres on different parts of the prepuce, and two on the glans penis; the appearance of which I can compare to nothing but the holes made by a rusty nail in a piece of mahogany or logwood. He was young, robust, plethoric, and of the sanguine temperament. The skin was hot, pulse sharp and quick, tongue white, and eyes red, though he had been guilty of no intemperance in drinking. The catastrophe, if left to nature, ere mercury was in fact at hand, or a few doses of bark, wine and opium, would have inevitably sealed his fate; but I caused him to be copiously blooded, applied the coldest acetous lotions to the part,

purged him most freely with neutral salts, and enjoined every part of the antiphlogistic regimen. The success was perfect, the tumefaction speedily subsided; in a few days all the sores were in a state of the healthiest suppuration, and I have no doubt, so thoroughly had the specific contagion been superseded by the violence of the inflammation, would have healed safely without mercury, had either the patient's fears, or my own responsibility, permitted me to run the risk. The woman who communicated the infection, was an opera dancer in Lisbon, apparently in perfect health, who continued upon the stage for many months afterwards, occasionally infecting others, without any thing extraordinary, as far as I could learn, in the nature of the symptoms.

At the time this event happened, there were no less than five cases in the general hospital at Lisbon, of the same shocking mutilation, which my friend so narrowly escaped; although the army had been only a very short time in the country. That ulcers, whether spontaneous or excited from slight external causes, have become the depot and the outlet of the matter of fever, whatever that may be, has long been known to intelligent medical observers. In the mountainous districts of the West Indies, they were endemic, seldom appearing where the leading cause existed in sufficient force to generate ardent fever, but confined within a certain range of space and temperature, and occupying

that niche in the scale of tropical disease, between the bounds of the acute endemics and European health. It is not, always, however, that they have thus been found to be graduated to points of locality; for they have been known to spread epidemically through fleets and armies, and in different parts of the world to become the substitutes and representatives of acute constitutional disease*: a remarkable instance of which occurred under my own inspection in the Buckinghamshire militia, while quartered at Ottery barracks in Devonshire in the autumn of 1806, during the prevalence of the acute autumnal epidemics, from which they were entirely exempt; but they were visited in fully as great a proportion by spontaneous phagedænic ulcers of the legs, of dreadful character, and yielding only to the antiphlogistic treatment. But to return to the subject of the venereal disease in Portugal, I am aware it has been said, and will be said again, that the difference of the symptoms as presenting themselves in the constitution of the Englishman and the native, is to be accounted for from the respective organization of each; the first abounding in irritability from a great variety of causes, and prone to assume the most violent forms of action; the latter, of asthenic character, easily acted upon by remedies, and affected principally by diseases of relaxation and debility: but though

* Dr. Jackson, I believe to be the first West India physician who satisfactorily explored these truths, and made others sensible of their value.

I allow this to be good for as far as it goes, it can be applicable as an answer to a small part only of the foregoing; and whoever desires to come at the truth, must, like me, endeavour to detect other reasons.

I think it probable, that by the resistance we have opposed to syphilis and variola, we have retarded their natural decay amongst us. That we have made both more rare, I believe; and that we may finally succeed in extinguishing both, I devoutly hope; but whenever we are revisited by either the one or the other, I fear they will not come to us disarmed of their terrors.

The Portuguese, through apathy, and at a dreadful price levied on the generations that are past, and never, in all probability, to be redeemed by their descendants, appear to have gained a great exemption from their immediate effects; but the price was too high, and God forbid that we, in despite of the faculties with which we have been gifted to preserve ourselves and others, should ever offer up our bodies to be the unresisting subjects of disease, the fatal consequences of which, though they might go to extinguish one or two ills, would be felt in the deterioration of our race to the most distant ages.

There still remains for consideration one phænomenon of the disease, which travellers have asserted

to exist, and many have taken for granted; that of its being transmitted hereditarily in the secondary form; not appearing as with us in the infant soon after birth, but affecting the constitution about the age of puberty, with nodes, tetters, &c.—I confess myself unequal to the solution of this question; I certainly have seen some supposed cases of the kind, but still I do not feel warranted to repose on them implicit belief, having been prevented tracing them effectually through the jealousy of the native faculty, who in this country are ever prone to proclaim all foreigners as heretics in physic, with whom no communion is to be held; and who exert themselves almost always with effect, in filling the minds of their patients and the people with the most absurd prejudices in regard to them.

That an infected child may be born, and through defective, or only palliative, means of cure, may remain uncured till the age of puberty, I am far from thinking impossible; but without further proofs, I am not yet disposed to believe that the disease can be latent in infancy, and make its first appearance at that period of life: a more natural solution of the question seems to present itself, on viewing the frame of society in this country amongst the higher orders, where such cases are generally said to be found.—These are restricted in their marriage alliances to the degree of nobility to which they belong; a field often so narrow, that near relatives, such as uncles and nieces, are not unfrequently matched

together: and a Portuguese nobleman, instead of preserving and improving his race, by mixing in the great family of mankind, as God and nature have ordained, can seldom marry beyond the pale of his own family connections. The punishment which awaits this order of things, so repugnant to the dictates of nature, is as infallible here, as in other countries amongst other races of men.

Every casual vitiation of stamina to which the healthiest stocks may be liable, and which would as certainly be corrected by a succession of healthy alliances, as the hue of the Ethiop received into a community of whites would be washed from his descendants, is perpetuated by constant reinoculation upon itself, and becomes inveterate; till at last, decrepitude of body, and imbecility of mind, are the certain portion of the offspring. The progenies vitiosior, in a bodily sense, is every time reproduced, going on to deterioration; and under such circumstances, the phænomena of struma may rationally account for the deformities and sufferings that have been laid to the charge of the venereal disease.

CASE

OF

PARALYSIS OF THE FACE,

SUCCEEDED BY

CERTAIN NERVOUS DISORDERS.

By EDWARD PERCIVAL, M.D.
PHYSICIAN TO THE HOUSE OF INDUSTRY, DUBLIN.

COMMUNICATED

By Sir GILBERT BLANE, Bart.

Read January 5, 1813.

THE following case is submitted to the attention of the Society, as exhibiting a singular and connected series of nervous diseases, which occurred in a young and hitherto healthy female. Each disorder, or class of symptoms, taken separately, is by no means of rare occurrence; but their regular sequence, each distinctly lapsing into the other, together with a community, in a considerable degree, of curative indication throughout, seem to point to some views of pathology, which are not wholly uninteresting nor uninstructive.

M. M. aged seventeen, an unmarried female in the middle rank of life, of a fair complexion,

sensitive and irritable habit, but robust form, who had enjoyed uninterrupted health from her infancy, exposed herself, about the 23d of August, 1810, whilst overheated, and perspiring from exercise, to a current of cold air, which passed from an open window, chiefly over her head and neck. On the following day she experienced some uneasiness from stiffness of the muscles in the parts which had been exposed; pain and swelling gradually supervened, and were followed, in the course of a week, by torpor and paralysis of the entire left side of her face, scalp, fauces and neck.—On the 7th of September I saw her for the first time; and found her face considerably swelled, her head drawn to the right side, her articulation very imperfect, and her power of deglutition and swallowing so much impaired, that she could suffer only small portions of liquids, and by great effort, to pass down her throat. Her left eyelid remained permanently half closed, and the right angle of her mouth was considerably drawn aside. She complained of acute pain in the right side of her head, great giddiness and occasional stupor. Her bowels were reported to have been freely purged, but her tongue was foul, and her mouth beset with minute ulcers. Her pulse was fluttering and uncertain, but on continued examination did not appear to exceed 76 strokes in the minute. She was free from thirst, heat, or any other symptom of fever. A blister had been applied, and kept open for some days

behind her left ear, but without any apparent benefit. I therefore directed the right side of her head to be shaved, and the whole surface to be covered, on the following day, with a sharp blister. She suffered much pain during the application, the discharge was copious, and the relief of all the paralytic symptoms was considerable. Sensation, which was previously abolished, now revived in the muscles and integuments of the parts affected, and a visible improvement of her countenance took place. A purgative powder of calomel and scammony was administered with satisfactory effect.—On the 10th a blister was applied to the nape of the neck, and on the 12th another was placed on the head. The effect of these remedies was in all respects favourable to my wishes, until on the 13th so violent a strangury occurred, in spite of all the means used to prevent it, that I was obliged to desist from any further use of blisters. Some distressing hysterical affections followed, which were however mitigated, by purgative and tonic remedies, and by the occasional use of the warm bath.—As my patient resided fifteen miles from Dublin, I had not an opportunity of revisiting her until the 25th, when it was reported to me that she had suffered much during that interval, from headach, giddiness and frequent nervous agitations. Her paralytic affection remained as when I last saw her; which was so far amended that she could speak and swallow without difficulty, and when her features were quiescent, her counte-

nance was natural.—At the suggestion of my friend and colleague Dr. Perceval, *rhus toxicodendron* was administered, in small doses, but without any sensible effect. My patient's bowels being extremely torpid, active and varied purgatives were taken by her almost daily, and always with apparent advantage. I then prevailed upon her to make a trial of electricity, which was administered by sparks and gentle friction over the surface of her head, face and neck, and along the course of her spine. By these means, in the space of a few days, the remains of her paralytic affection had nearly disappeared; when, on a sudden, her hysterical symptoms recurred, with so much violence, attended with faintings, convulsions, &c. that the electricity was necessarily discontinued. Shortly after this, I was called to see her in the country, I found her in a state of hysteric or cataleptic torpor. Her breathing and her pulse were soft and natural: but her belly was tumid and hard, and her extremities were alternately cold and hot. Her eyes were half open, but her sensibility was almost entirely extinguished. In this condition she remained several hours, interrupted occasionally by strong agitations and convulsive movements of the extremities and of the spine. Her eructations were copious, and her greatest distress appeared to arise from the generation and confinement of wind in her stomach. Æther, spirit of ammonia, warm fomentations, and sinapisms afforded no relief. Ginger-tea, with pills made, at the instant,

of Cayenne pepper and crumb of bread, abated the flatulence, as often as we could succeed in administering them. These fits of cataleptic torpor recurred, almost daily, for two or three weeks; sometimes occupying only a few minutes, at others, seven, or even eight hours. Topical bleeding from the head was generally followed by temporary relief; but active and unremitted purgatives seemed to afford the most decisive benefit. The quantity of matter discharged from the bowels, was by no means considerable, nor particularly unnatural in its appearance. By degrees, the patient became convalescent, and took the benefit of air and exercise most diligently; and before the end of October, she appeared to be in all respects perfectly recovered. Through the whole preceding, and indeed subsequent period of her illness, the catamenia appeared irregularly, but rather more frequently than natural. The discharge was neither deficient nor profuse in quantity.

On the 22d of December I was again called to see this young woman. Without any apparent cause, her appetite had gradually failed; and her stomach now rejected all food or medicine, a few minutes after they were swallowed. Her flesh and strength, which had been very little impaired during her preceding illness, were now more robust than when I last saw her; and her florid complexion indicated no malady. Her pulse, however, was somewhat smaller and more hurried than

it used to be, yet, rarely beat more than 90 strokes in a minute. She complained much of pain in her left side, of heart-burn and acid vomitings. The seat of pain was immediately below the left mamma; and a careful examination by pressure and change of posture, convinced me, that it probably arose from the distension of flatulence, which occupied both the stomach and the whole course of the intestines. She had no cough or diurnal fever. Opium, assafœtida, camphor, myrrh, alkalis and saline effervescing draughts, were administered in various doses and combinations. Their effects were salutary, but fleeting. A small blister, and ointment of emetic tartar were successively applied to the scrobiculus cordis, but without any apparent advantage. Many days elapsed during which all food, even of the lightest kind, and in the smallest portions, was rejected a few minutes after it was swallowed. By degrees, however, the interval was prolonged; and the first material to which the stomach was reconciled was a mixture of milk and limewater in equal portions. During the space of three weeks, she was nourished chiefly by alimentary injections, which were exhibited at night, and the feculence removed by purgative injections in the morning. Under the protection of opiates, calomel and rhubarb were freely administered, with very sparing, but always beneficial effects. In this state she continued, with very slow progress of amendment, consuming, at the utmost, six or seven table-spoonfuls of milk and limewa-

ter daily, until the middle of January 1811, when I once more visited her. She had never become thinner during her illness; but she now seemed to have gained flesh; and the colour, not only of her face, but of her whole skin was more erubescent; so that excepting some expression of anxiety in her countenance, her appearance in general indicated health. She still complained of the pain in her left side, of giddiness and other uneasy sensations of her head, and of disturbed rest at night. Eight ounces of blood were taken from her arm, and a few leeches applied to the pained part of her side with advantage. The purgatives were continued, and her stomach gradually recovered its original power and functions.—On the 1st of February she was again bled on the same indication as before. Some light bitters, with vegetable aperients and occasional antacids, were now the only remedies prescribed. The symptoms were removed and did not again recur; and on the 1st of March she was in perfect health; having resumed all her former habits of diet, exercise and occupation.

From the period here specified, to the present date (October 1812), my patient has continued free from all material ailment.

It is deserving of remark that throughout the whole course of the disorders just narrated, the most prominent feature of practical indication, was

the great and obstinate torpor of the patient's bowels. Purgative medicines always afforded decisive relief; and bad consequences always followed the neglect or inefficacy of them. Yet the evacuations were by no means so foul, or unnatural in their appearance, as I have commonly witnessed in intestinal derangements. Neither did the free use of calomel produce any ptyalism, or excessive discharge of bile, at any period of the disorder.

Whether the hysterical symptoms, in the case here related, which were of extraordinary severity, are to be traced to the operation of the blisters prescribed for the paralytic affection; and whether the protracted incapacity of retaining any substance in the stomach, is to be esteemed only a modification of hysteria: thus reducing the three successive disorders to the same class of *nervous* derangements, I presume only to conjecture. The narrative of facts is authentic; and, I venture not to trespass on the valuable leisure of the Society, by obtruding any hypothesis which may have presented itself to my own imagination.

AN INSTANCE

OF

SPASMODIC AFFECTION

OF THE

TONGUE AND MOUTH,

SUCCESSFULLY TREATED;

By MR. JOHN MITCHELL,
SURGEON, OF KINGTON, HEREFORDSHIRE.

COMMUNICATED BY

ALEX. MARCET, M.D. F.R.S.

Read Jan. 19, 1813.

I WAS desired on Saturday, 19th Sept. 1812, to visit Mrs. Stokes, a servant of the Hon. Andrew Foley, residing near Newport, about four miles from Kington, who was supposed to have had a paralytic stroke. She had attained her fiftieth year, was the mother of one child, and the catamenia, though they had not disappeared, had become irregular, and diminished in quantity. I found her perfectly sensible, and from her account I learned, that she had this day been suddenly seized with an affection, in which, to use her own words, " she

felt something drawing her tongue and mouth to the left side; it took her speech away, and her face shook very much." Upon inquiry I learnt that this attack had not deprived her of her understanding, nor had it been preceded by giddiness, loss of sight, pain in the head, or any other symptom denoting fulness of the vessels of the brain. She had perfect feeling in her upper and lower extremities, and did not appear to suffer any thing material about two hours after the attack, excepting that her speech was not quite so distinct as usual, and her mind much hurried, and under the impression of having experienced a paralytic seizure. Her pulse was good, being only a little quickened, and participating with her general disturbed feelings. Her tongue was furred, and she had been costive for some time past. She thought her stomach out of order, from the bitter disagreeable taste she felt in her mouth in the morning for some time previous to the attack.

Twelve ounces of blood were taken from the arm, and a blister was applied between the shoulders; a purgative mixture of infusion of senna and sulphat of magnesia was given every two hours, and one grain of emetic tartar administered in the first dose.

Monday, Sept. 21.—She feels better, but the "catchings" (to use her own expression) have continued to attack her frequently since I last saw her.

I was naturally led to inquire into the nature of these symptoms, and found that the sensation began in the root of her tongue, which she described as feeling hard like a bit of wood, and as being drawn strongly against the left side of the internal part of her mouth. The left side of the mouth she stated was also drawn and shook, but the shaking, after continuing a few seconds, subsided again. She urged me to stay with her, that I might have an opportunity of witnessing the complaint, which I did nearly an hour, but it did not return. All I could perceive was a continual twitching of the Occipito-Frontalis and Orbicularis Palpebrarum muscles. Tongue clean. Pulse 75. Five grains of calomel and six of rhubarb were given at bed-time; and a mixture of infusion of quassia, tincture of gentian, and subcarbonate of soda was directed to be taken every five hours; and a combination of tincture of lavender and fœtid spirit of ammonia to be taken after every spasm.

Wednesday, Sept. 23.—She feels better to-day and is quite well, independent of the "catchings," but complains much of their frequency and increase of strength. She had an attack while I was present. Her tongue was drawn forcibly in a curved direction towards the left upper molares, the teeth were clenched, and the lower lip much distorted, from being drawn forcibly down, and to one side, by a strong spasm in the left Depressor Anguli Oris, and Depressor Labii Inferioris muscles. It

continued some seconds, and gradually subsided. Her intellects remained clear during the paroxysm.

Seven grains of calomel were given at bedtime; and a purgative draught the following morning. The fœtid mixture was continued.

Friday, Sept. 25.—Her health is good. The spasms are stronger and return every twenty minutes, and her whole face and even her eyes are, in some degree, affected by them.

Ten grains of calomel were given at bedtime, and a strong purgative draught of jalap and scammony the next morning. A mixture of volatile tincture of valerian, tincture of assafœtida and tincture of castor, was given three times a day.

Monday, Sept. 28.—The spasms increase in strength, and return every fifteen minutes. With the muscles of the face, those of the left side of the neck, begin also to be affected; she has frequent sighing, and spasmodic twitchings pierce from the Scrobiculus Cordis to the back, and dart into the chest.

An ounce and a half of the Mistura Ferri Composita was given evening and morning.

Thursday, Oct. 1.—The spasms are more frequent, and more generally affect the muscles of the

face and neck. The diaphragm and muscles about the chest also sympathise, and a numbness is felt running from the neck, down the left arm, to the thumb and forefinger.

No wound of any description has been inflicted on any part of the body lately; nor for some months previous to the attack, that can be remembered.

The steel medicine is continued; and twenty-five drops of tincture of opium, with the same quantity of fœtid spirit of ammonia, are directed to be taken every night at bedtime, in camphor julep.

Saturday, Oct. 3.—The spasms were not so frequent during the night on which the first opiate was given, but now they return every ten minutes.

Sunday, Oct. 4.—No amendment, on the contrary all the symptoms are much increased; the spasms return once in ten minutes, and now and then one spasm succeeds the other so rapidly, that an interval can scarce be perceived. The following are the feelings as expressed by the patient, and the appearances as observed by myself on this day.

Antecedent to the spasm, a sensation of lowness and sighing was felt in the præcordia, attended with acute darting pains, flying from the lower part

of the sternum to the spine, and perpendicularly up the chest till they reached the root of the tongue, which became rigid. A numbness is now experienced on the left side of the nose, and point of the chin: the whole tongue feels like a piece of hard wood, and its apex is drawn forcibly and laterally, in a curved direction upwards, and to the left side of the roof of the mouth. In succession, the left angle of the mouth becomes much opened and distorted, from a violent contraction of the left Depressor Anguli Oris, and Depressor Labii Inferioris, which shewed the teeth fast clenched; all the muscles of the face are now thrown into a state of rigid distortion: the nose appears drawn to the left side, and the nostrils widely expanded; the eyes are wide open, and the white part of them only is to be seen, the left being drawn forcibly to the outer and the right to the inner angle, and both immoveably fixed in their sockets. The Occipito-Frontalis and Corrugator Supercilii muscles partaking of the spasm, throw the forehead into numerous wrinkles, and the whole countenance by this time assumes the most ghastly and distorted grinning. With these appearances the head seems to be cringing from the weight of a burthen placed upon it, in consequence of the muscles of the neck drawing it round to the left shoulder, occasioning an appearance, as if the left ear and chin were about to recline on the point of it; the left arm is rigidly extended, and a numbness is felt running from the neck down it, in a straight line to the thumb and

forefinger. The intellectual functions are undisturbed, and the actions of the heart and lungs are not impeded or varied during the continuance of the paroxysm. After continuing in this state about three minutes, during which time all the muscles of the head, face and neck are held in a state of rigidity, the complaint suffers a remission, which is observed by a rapid tremulous motion of all the muscles affected, in consequence of the gradual cessation of the spasmodic action, and the antagonist muscles regaining their usual equilibrium. The effect of this is a shaking of the arm and head, and all the features of the face appear incessantly and variously convulsed. The eyes have a rapid motion and varied strabismus, and the whole countenance displays the most violent conflict. At length tranquillity is restored, and the sufferer experiences a short respite from the painful stretching of all the parts, when only a slight soreness remains.

From the commencement to the present time, she has taken food and slept in the intervals; but the spasms have returned with precise exactness night and day according to the length of the various intermissions before stated.

It was suggested, in consultation, by Dr. Thomas* of Kington, that some local irritation on the

* Dr. Thomas informed me that many years ago, he saw a young man (with symptoms very much resembling those of the present

nerves of the mouth might produce the complaint. The teeth were examined, and though they did not ache, yet the whole of them situated on the upper and left side of the mouth, were in a decayed state, and highly sensible when touched with a probe. The two left incisores and the left cuspidatus were broken off, and the gums surrounding them were inflamed and irritable. A discharge of fœtid matter issued from the decayed fangs, and which I found had several times come from the nose. The two bicuspides and the three molares were also carious. It was determined, for the present, to act upon these diseased parts, and to consider them as the source of the irritation. The second molaris was therefore extracted, and the spongy gums enveloping the fangs of the incisores and cuspidatus were freely scarified. Warm milk and water was directed to wash the mouth frequently, and a brisk purgative of infusion of senna and sulphat of magnesia was given the following morning.

Monday, Oct. 5.—The spasms do not return so frequently; they are not so strong, nor do they last so long.

The gums were again scarified, the tepid wash continued, and one grain of extract of henbane and ten of castor were given night and morning.

present case) whose face was attacked with spasms and the tongue thrust out of the mouth, cured by extracting a carious tooth.

Tuesday, *Oct.* 6.—The spasms continue as frequent as yesterday, but their violence and length of continuance is much abated.

The fang of the cuspidatus is extracted, the warm lotion and medicine as yesterday repeated.

Wednesday, *Oct.* 7.—The spasms are as yesterday. The fangs of the two bicuspides were extracted. The warm lotion and medicine as yesterday repeated.

Thursday, *Oct.* 8.—The spasms return once in twenty minutes; sometimes there is an intermission of half an hour. They are not so strong, nor do they continue so long as usual.

The fangs of the two incisores were extracted and the gums freely scarified. The warm lotion was continued, and a liniment was rubbed upon the gums composed of a drachm of borax and an ounce of honey. The henbane and castor repeated.

Friday, *Oct.* 9.—The spasms are more frequent, but their violence has much subsided. The head is not drawn to the left shoulder; the eyes are less distorted; the darting pains in the direction of the diaphragm are trifling; and the muscles of the face are more tranquil, except the depressors of the left angle of the mouth; they still produce distortion.

The first molaris was extracted, and the local applications were repeated. Ten grains of musk and ten of calomel were given this night, and on the 10th; and ten grains of musk on each of the following mornings; an ounce and a half of decoction of bark and half a drachm of the powder were given three times a day.

Monday, Oct. 12.—The spasms return only once in an hour, and are very trifling, the muscles at the angle of the mouth being the only ones that are now affected. All medicines were discontinued.

Wednesday, Oct. 14.—The patient is quite well, a slight quivering only is to be observed in the Depressor Anguli Oris, once in two or three hours, and that in so slight a degree, as to escape observation, had not a gradual diminution, from the most violent spasms, to the present simple vibratory motion, been experienced.

Saturday, Oct. 17.—The patient has lost all spasmodic action.

TWO EXAMPLES OF THE

BENEFICIAL

EFFECTS OF MERCURY

IN SOME

SEVERE AFFECTIONS OF THE BRAIN.

By COLIN CHISHOLME, M.D. F.R.S.

CASE I.

A FEMALE, aged 17, to whom I was called in August 1811, had for some time been affected with a pain in the region of the liver, accompanied with irregular symptoms of hysterics. The catamenia were regular in their periods and quantity. She was put on a course of mercury, and recovered from all her complaints. In December following there was a relapse of these complaints; but the hysterical affections were more violent, for there were frequent paroxysms, in which, after strong convulsions, she fell into a state of mental derangement, consisting in delirious ravings and bursts of laughter. The natural functions were not interrupted; she had even a ravenous appetite. As

the pain in the right hypochondrium continued, leading to a suspicion that an affection of the liver might have a connexion with these symptoms, the mercurial course was repeated, so as to produce a copious salivation. Under this all the symptoms disappeared. From an imprudent exposure to cold, before she had recovered her strength, all the same symptoms again returned. I had, on this occasion, an opportunity of verifying what Dr. Parry has alleged respecting the compression of the carotid arteries; for I found that this instantly, though temporarily, stopped the convulsions. On the first compression she fell into a state of syncope, and also on the second; but to this succeeded a state of general rigidity of the whole body and extremities, and a suspension of respiration, answering to the description of catalepsy. In ten minutes she started up in a state of mental distraction, which continued for ten minutes. She then relapsed into the cataleptic state; this alteration continued for an hour and ten minutes, and she then recovered her reason and recollection. Recourse was again had to the mercurial plan with complete ultimate success.

CASE II.

A woman, aged 50, to whom I was called on the 1st June, 1812, had, about six weeks before, as I was informed, been suddenly seized with excessive headach and vertigo, dimness of sight, palpitation, sense

of stricture across the *scrobiculus cordis*, great heat of skin, quick and strong pulse; there had also been a sense of suffocation and a fit of convulsion, which lasted for some hours, and was succeeded by *mania*. The whole paroxysm was completed in twelve hours. These fits returned daily. Evacuants, which I directed, seemed to relieve her, insomuch that she was free from fits till the 6th, when they recurred with much more violence than ever; for the most forcible means of coercion became necessary to restrain her under her tumultuous maniacal emotions. Encouraged by the favourable termination of the former case, I put her under a course of mercurial friction. In six days after commencing this, the paroxysms had entirely vanished, and she was restored to her reason. The friction having been continued so as to produce a ptyalism, she recovered her health, and remained well when I last saw her, which was the 27th of December.

Bristol, 1*st Jan.* 1813.

ANALYSIS

OF THE

BONES OF THE SPINE,

IN A CASE OF

MOLLITIES OSSIUM.

By JOHN BOSTOCK, M. D.
VICE-PRESIDENT OF THE LIVERPOOL LITERARY AND PHILOSOPHICAL SOCIETY, &c.

Read March 2, 1813.

ALTHOUGH it is generally understood, that in the disease called Mollities Ossium the bones are deficient in their proportion of earthy matter, yet I am not aware of any actual analysis of them that has been made. On this account I embraced an opportunity which presented itself of examining their composition, and I propose to submit to the Society the result of my experiments.

I received from Thomas Christian, of Liverpool, two of the dorsal vertebræ, with their accompanying ligaments and membranes, of an adult female, whose bones were discovered after death to be

unusually soft and flexible. On account of the extreme softness of the bone it could not be detached from the periosteum: the whole was therefore kept for some days in cold water, in order to separate the blood and other extraneous matters. One of the vertebra was then digested for about an hour in warm water; the ligaments and membranes were now easily removed from it, and the bone itself, when dried by a moderate heat, was found to have lost a considerable portion of its weight, aud to be converted into a substance of an extremely porous and delicate texture. The body of the vertebra separated with a slight touch from the processes, and the central part of the body itself possessed so little coherence, as scarcely to permit it to retain its usual shape. The water in which the bones had been digested, as it cooled, exhibited on the surface a layer of fatty matter, and the fluid itself produced a considerable precipitate with the tincture of galls, thus proving that it contained a portion of jelly. After having been dried by a moderate heat, 50 grs. of the body of the vertebra was exposed for two hours to a red heat, when only 13,5 grs. were left of a coarse white powder. The proportion of earthy matter in the processes was still smaller: the whole, which after desiccation weighed 106 grs., was reduced by calcination to 17 grs. A portion of this powder had four times its weight of muriatic acid added to it, mixed with an equal bulk of water, by which it was quickly dissolved with effervescence.

A portion of the bone in its entire state, was subjected to the action of diluted muriatic acid, and after being digested for ten days, it was removed, well washed in cold water, and then dried by a moderate heat, when it was found to be considerably more soft and flexible than before the experiment. The fluid in which it had been digested was copiously precipitated by ammonia. The bone was then boiled in water for half an hour; by this operation it was entirely broken down into small flakes, while the periosteum was left entire, although diminished in bulk.

These experiments decidedly proved, that this diseased bone was very deficient in the usual proportion of earthy matter. A healthy bone, after having been calcined, retains its form and a considerable degree of hardness, and the digesting of bones in hot water does not materially affect their shape or their texture, unless they have been reduced to small pieces, or have been acted upon by a high temperature under an increased pressure.

The following method of calculation will enable us to form a rough estimate of the composition of the diseased bone. One quarter of the body of one of the vertebræ, with its investing membrane, was dried by exposure to the open air for fourteen days, and was found to weigh 52 grs.; the membrane, when detached by boiling, weighed 19 grs., and the bone itself weighed 15,5 grs. What was

removed by boiling, amounting to 17,5 grs., must have been the jelly and oil, and of the 15,5 grs. of bone we may conclude from the effect of calcination, as stated above, that 4,05 grs. alone would consist of earthy matter. In order to ascertain how much of the jelly and oil was contained in the bone itself, and how much in the investing membrane, a portion of membrane was digested in weak muriatic acid, then well washed in cold water, and afterwards boiled for some time, by which it was reduced from 33 grs. to 19,5 grs. Hence it will appear that about 13 of the 17,5 grs. must be given to the membranous matter, leaving 4,5 grs. of jelly and oil for the bone itself. By a simple calculation we shall find that 100 parts of the bone, independent of its investing membrane, consist of

Jelly and oil -	22,5
Earthy matter -	20,25
Cartilage - -	57,25
	100,00.

Although the analysis of bone has engaged the attention of some of the most eminent chemists, both in this country and in France, yet there is still a degree of doubt respecting the exact proportion of its ingredients. This is occasioned by some uncertainty as to the state of the bones previous to their examination, and also from the vague ideas, which, until very lately, were entertained concerning the different species of animal sub-

stances. When bones are analysed, they are generally used in what is called a dry state, but it is evident that this term can only be employed in an indefinite manner, and that no degree of desiccation can remove from the bones the oil, and probably a portion of the water, that is diffused through the cells; this can only be accomplished by breaking the bone into small pieces and boiling it, and the process of boiling, at the same time that it removes the oil, will also dissolve the jelly, which probably ought to be considered rather as one of the proper constituents of the bone, than as a substance mechanically diffused through its parts. Without proper precautions there is also reason to apprehend, that the process of boiling would likewise remove part of the membranous matter. These observations apply to the first of the circumstances which I mentioned, and I have only to remark, that even M. M. Fourcroy and Vauquelin, who have paid so much attention to the subject of animal analysis, make no mention of any animal substance, as entering into the composition of bone, except solid gelatine*. Making use, however, of the best data which we possess, we may conclude that human bones in their natural state, contain considerably more than half their weight of earthy matter, whereas the diseased bone in

* Ann. Chim. 47. 258. Mr. Hatchett, in his valuable experiments on bone, only examined the nature of their ingredients, without attempting to ascertain their proportion.

question contained in one part one-fifth only, and in another one-eighth of its weight.

The analysis of the earthy matter of the bone was then attempted in the following manner. A portion of the calcined bone was dissolved in four times its weight of diluted muriatic acid. To this solution ammoniac was added in excess, which threw down a copious precipitate, which was collected and calcined at a red heat (*a*). The fluid had then carbonate of ammoniac added, by which a flocculent precipitate was thrown down in small quantity; this was also collected and dried (*b*). The residual fluid was lastly precipitated by muriate of barytes, and the precipitate was collected and calcined at a red heat (*c*). The precipitate from the muriatic solution by ammoniac (*a*) was boiled in potash, and after being collected and dried was again boiled in acetous acid; the residual fluid was then precipitated by carbonate of soda, and the precipitate was collected and calcined at a red heat (*d*).

Considering the precipitate by pure ammoniac (*a*) as a mixture of the phosphates of lime and magnesia, and the last precipitate (*d*) as pure magnesia, the quantity of phosphate of magnesia in the former precipitate was estimated. The second precipitate (*b*) was supposed to be carbonate of lime, and from the quantity of sulphate of barytes in the third precipitate (*c*) the quantity of

sulphate of lime in the bone was ascertained. The respective quantities were nearly as follows:

Phosphate of lime -	67,2
Sulphate of lime -	23,2
Carbonate of lime -	5,6
Phosphate of magnesia	4
	100,0

The composition of the entire bone will be as follows:

Cartilage - - -	57,25
Jelly and oil - -	22,5
Phosphate of lime -	13,6
Sulphate of lime -	4,7
Carbonate of lime -	1,13
Phosphate of magnesia	82
	100,00

The usual tests for iron were employed, but there was no indication of its presence.

Ashtole Bank, near Liverpool,
Dec. 2, 1813.

INSTANCE

OF THE

GOOD EFFECTS

OF

ARSENIC IN CHOREA.

By Mr. THOMAS MARTIN,
SURGEON, OF REIGATE.

COMMUNICATED

By DR. ROGET.

Read Feb. 2, 1813.

A GIRL aged fourteen, of quick parts, and active disposition, and who had not yet menstruated, had for several weeks been subject to involuntary motions of the limbs, and gesticulations of the whole body, which gradually increased until they became almost incessant, and so violent, as to produce severe contusions by the blows inflicted on herself. She seized every thing within her reach, dashing and throwing continually. These symptoms were accompanied with frequent shedding of tears, and other symptoms of hysteria; together with some degree of amentia. During her short and disturbed sleeps in the night, she

had very frequent agitations and convulsive motions, and was much harassed by dreams.

She complained of pain in the head, which affected the vertex chiefly; and a difficulty of swallowing, as well as of masticating her food. Her articulation was broken and indistinct. Her pulse was variable, but generally quicker than natural; her appetite for food, although not inordinate, was more than was proper. She had never been subject to worms, and her bowels had not been constipated, nor in any way disordered.

About eight years ago, she had the hip disease in its primary state, with an elongation of the limb of the diseased side, and which was cured by the means now usually employed. Since that time, until the present attack, she has enjoyed good health.

A few doses of strong cathartic medicine, proved that the cause of this disease was not in a *loaded* state of the bowels; and, as far as was apparent, there was no morbid action in any part of the alimentary canal.

Looking therefore to the head, as the source of the malady, and from the pain, which continued unabated, suspecting there was congestion of the vessels of the brain, whatever other diseased action there might be, I ordered the head to be

shaved and bathed several times a day, with cold water and vinegar; the shower bath to be used every morning, and the diet to be slender, taking only small quantities of food, and animal food in substance every other day.

I administered the digitalis in infusion, so as to produce its specific effect on the action of the heart and arteries, but without any beneficial result; the gesticulations and involuntary motions continuing as violent as ever, during the day, although her nights were passed rather more quietly. I then determined on making trial of a purgative pill, (the pil. cambogiæ comp.) every night, so as to act gently on the bowels; and the solution of arsenic three times a day, in doses, beginning with five drops, and increasing one drop every day, until it might begin to disagree with the stomach and bowels, which it did when it was augmented to thirteen drops. The dose was then diminished, and continued at about ten drops, during six weeks.

Soon after this plan was adopted, the symptoms began to abate, and they gradually subsided, until the cure was completed.

AN EXAMPLE

OF

SYMPTOMS

RESEMBLING TIC DOULEUREUX,

PRODUCED BY A

WOUND IN THE RADIAL NERVE.

COMMUNICATED, IN A LETTER, FROM

ALEXANDER DENMARK, Esq.

SURGEON TO HASLAR HOSPITAL,

TO

H. LEIGH THOMAS, Esq. F.R.S.

Read March 16, 1813.

HENRY CROFT, a healthy young man, belonging to the 52nd regiment, was wounded on the night of the 6th April, 1812, at the storming of Badajos. A musquet ball entered the triceps extensor cubiti, about 1½ inch above the inner condyle of the os humeri, which, grazing the inside of that bone, passed obliquely downwards through the brachialis internus, and out anteriorly near the bend of the arm. The wound soon healed, and without manifesting any particular morbid symptom during the cure. On his admis-

sion into this hospital, I found him labouring under excessive pain, which the largest opiates could not assuage, with almost constant watching. The little sleep he had, if it could be called such, was disturbed by frightful dreams and starting. I always found him with the fore-arm bent, and in the supine posture, supported by the firm grasp of the other hand; the wrist also bent, being unable to move it into any other position by the voluntary exertion of its own muscles. He could suffer me to extend the hand, but with increased pain. It always, however, on the removal of the extending power, fell into its former bent situation. The act of pronation he could also suffer me to perform, but in like manner with increase of pain. A small tumor could be felt in the site of the wound on the anterior part of the arm, which he could not bear to be *touched* without evincing additional torture. He described the sensation of pain as beginning at the extremities of the thumb and all the fingers, except the little one, and extending up the arm to the part wounded. It was of a burning nature, he said, and so violent as to cause a continual perspiration from his face. He had an excoriation on the palm of the hand, from which exuded an ichorous discharge. The cause of this he ascribed to a shell rolling over it. His agonies, he observed, were insufferable, depriving him of sleep, and the enjoyment of his food, for which he had some,

times an appetite. He declared himself incapable of enduring it longer without some relief, and earnestly requested the removal of the arm. Before proceeding to any operation, I recommended him to try the effects of the warm and vapour baths, anodyne embrocations, &c.; but from none of these he experienced any alleviation of his sufferings.

The symptoms were sufficiently clear, I conceived, to lead to a correct prognosis. The part wounded, the nature of the pain, and its course from the fingers, with the exception of the little one, indicated the affection to be in the radial nerve. The increased pain attendant on the act of pronation further corroborated that supposition, from the pressure of the pronator teres upon the nerve in its passage through that muscle. The man said he had profuse bleeding after receiving the wound, yet the pulsation of the radial artery, I found to be as strong as in the other arm. It was difficult to suppose the radial nerve wounded, and the humeral artery to escape: such, however, proved to be the case.

I proposed to my patient the possibility of saving the limb, and relieving the pain, by cutting down upon the nerve, and removing a part of it, above the wound; which he willingly consented to, but observed, that he would rather have the arm am-

putated at once, than run the risk of a second operation. In a consultation which I held with my colleagues upon this case, when we considered the chance of failure, together with the injured state of the arm, and contracted elbow joint, we determined on the propriety of amputation. I immediately performed the operation, and with instantaneous relief to my patient. He was discharged cured in three weeks, having, in that time, rapidly recovered both his health and strength.

On dissecting the arm, I traced the radial nerve through the wounded parts. It seemed to be blended with, and intimately attached to them, for the space of an inch. It had been wounded; and at the place of the injury was thickened to twice its natural diameter, and seemed as if contracted in its length. This contraction, I thought, partly accounted for the bent position of the arm, and the increased pain on attempting its extension; but on further examination, I was surprised to find, on dividing the fibres on the posterior part of the wounded nerve, that there was a small portion of the ball firmly imbedded in it, which had been driven off by grazing the bone. This description of injury more fully accounts for the exquisite pain felt by the patient. The os humeri was discoloured where it was grazed by the ball, and the humeral artery was uninjured! The nerve was evidently thickened, both above and below the

wound. Would the division of the nerve, and cutting a piece of it out, have been attended with success?

Mr. Bell relates a case of injured popliteal nerve, in a sailor, which he was about to operate upon, and which resembled very much the present, except that the injury was occasioned by contusion; in this, by wound.

ON THE

NATURE AND ANALYSIS

OF

ANIMAL FLUIDS*.

By JOHN BOSTOCK, M.D.

VICE-PRESIDENT OF THE LIVERPOOL LITERARY AND PHILOSOPHICAL SOCIETY, MEMBER OF THE GEOLOGICAL SOCIETY, OF THE LIVERPOOL MEDICAL SOCIETY, &c. &c.

ALTHOUGH among the improvements of modern chemistry, the analysis of animal fluids has engaged the attention of some of the most distinguished experimentalists, yet it has not attained

* A considerable part of this essay was written when the author was favoured with a perusal of Professor Berzelius's paper, which was printed in the last volume of these Transactions. The perusal could not but be highly gratifying to him, as it afforded a strong presumption of the correctness of many of his opinions, to find that they had been adopted, without concert or communication, by one so distinguished for his learning and acuteness. The author has judged it proper to print the paper in its original state, although on several points he will appear to be only repeating what had been before announced by M. Berzelius.

a degree of accuracy proportionate to the progress of the other departments of the science. This is obvious from the vague manner in which many of the terms appropriated to these substances are employed, even by those writers whose language is in general the most correct. The words *serous*, *albuminous*, *gelatinous*, &c. seem to be sometimes used as synonimous, sometimes with reference merely to the consistence of the fluid, and in many instances, it may be confidently affirmed, that they have been employed where no determinate idea could have been affixed to them in the mind of the writer. In order to remove this confusion*, I attempted some time ago to establish more definite characters, for the substances which principally compose those primary or simple fluids, which are diffused through different parts of the body, and which enter into the composition of the more compounded or secondary fluids. My object was to discover tests, by the application of which the nature of the fluids might be ascertained, without subjecting them to decomposition, or resolving them into their ultimate elements. The substances which I originally included in the class of primary animal fluids, were

* The confusion of which I here complain, was more considerable when I commenced my experiments, in the year 1805, than at present. The labors of Dr. Henry, Dr. Pearson, Mr. Brande, and more especially, the minute investigations of Dr. Marcet have contributed to correct our ideas upon these subjects. To these names must now be added that of Professor Berzelius.

albumen, jelly, and the uncoagulable matter of the serum, which I denominated mucus; but having been induced in an early stage of my experiments to deny the existence of jelly as a constituent of animal fluids, (an opinion which has been since amply confirmed by others) the only two bodies which remain for consideration are albumen and the uncoagulable matter. In the present essay I propose to offer some observations upon these substances, in which I shall point out the means of detecting their existence, and the effect of different re-agents upon them; I shall give an account of a number of fluids which I have examined; and I shall conclude with some practical directions for the analysis of these substances.

The physical properties of albumen are well known, and are sufficiently distinct not to be confounded with any other substance. It is adhesive*, miscible with water in any proportion, and possessing the remarkable and characteristic property of being coagulable by heat. This peculiar process seems to be confined to a few animal substances, probably to two, albumen and the fibrin of the blood, the former being coagulated by heat, the latter, merely by being discharged from the vessels, and, as far as we have yet been able to

* I restrict the term *adhesive* to the property of causing the cohesion of surfaces to which the substance is applied; *tenacious* or *viscid* seem more properly to designate the power of being drawn into threads, depending upon a firmer union between the particles of the body.

discover, without the immediate co-operation of any external agent*. Albumen forms the chief part of the solid contents of the serum of the blood, of the white of the egg, and of a numerous class of animal fluids, which are discharged from what are called serous membranes, by a process, probably more resembling the passage of a fluid through a porous substance, than by secretion†. As it exists in the most concentrated state in the white of the egg, as it appears also to be more uniform in its nature in the egg than in the serum, I adopted the former substance as a standard by which to compare the other albuminous fluids.

Albumen ovi is strongly adhesive, it is readily miscible with water, although it requires a degree of agitation, and there are always some small films

* Coagulation has been confounded with other processes from which it ought to be discriminated; from *gelatinisation*, or the property which a warm solution of jelly possesses of becoming concrete as it cools, of *precipitation*, or the effect which the oxymuriate of mercury and many other substances possess, of forming a compound with an animal substance which is insoluble in water, and from the effect of *evaporation*, by which the watery part of a solution is removed, and the animal matter left in a solid form.

† The word *secretion* literally implies merely separation, but in the language of modern physiology it is supposed, that not merely the proportion but the nature of the ingredients of the secretion differ from that of the fluid from which they are produced. The water of hydrocephalus, although so unlike the serum of the blood, is produced by transudation, not by secretion.

left, which seem incapable of solution. These films are the remains of a membrane which divides the albumen into distinct compartments, and thus gives to the whole a slight degree of what may be called an organized texture, so that at first we find it difficult to divide it into distinct portions, but by agitation the membrane becomes so much broken down, that it can be dropped from one vessel to another almost as readily as water. There is some difficulty in determining how far the sensible properties of the white of the egg depend upon the albumen itself, and how far upon the substances that are mixed with it. Probably the odour and the taste are owing to the albumen itself, as they differ materially from the odour and taste of the uncoagulable matter, and they can scarcely be ascribed to the saline impregnations. They are both specific, they do not exactly resemble the odour and taste of any substances except those that contain albumen, and when they have been once perceived, they are ever afterwards easily recognized. The colour of albumen, I am disposed to think, depends, in part at least, upon the substances mixed with it. In one instance which fell under my observation, where the colour of the serum was much deeper than ordinary, it was found to contain an unusually large proportion of uncombined alkali, and, I think, I have observed the same circumstance to occur in other cases, although in a less marked manner. Albumen ovi always contains an excess of uncombined alkali.

The specific gravity of albumen ovi I have found to be pretty uniform, it may be stated at 1.0408*. The white of a pullet's egg will be found upon an average, to weigh between 350 and 360 grs.; the quantity cannot however be ascertained with accuracy, as a portion always adheres to the shell and to the yolk.

There is some difficulty in ascertaining the proportion of solid contents in albumen ovi, as well as in all other albuminous fluids. The quantity of water which they contain is very considerable, forming the greatest part of their weight, and this water is so intimately united to them, and adheres so strongly to their particles, that it requires a long continued application of heat entirely to remove

* It not unfrequently happens in the analysis of animal fluids, that the quantity upon which we are to operate is so small, that it is difficult to ascertain its specific gravity, by employing the usual apparatus. In this case some judgment may be formed by finding the amount of its solid contents, but unless the nature of the substance dissolved be similar, the specific gravity will not be exactly indicated by the quantity of matter left after evaporation. Equal quantities of gum arabic, albumen ovi, and white sugar, dried at the same temperature, were dissolved in equal quantities of water; the specific gravities were respectively 1.06, 1.04, and 1.057. The same disproportion between the specific gravity and the solid contents may be supposed to occur in animal fluids, because these fluids contain not only variable quantities, but variable proportions of albumen and uncoagulable matter. Accordingly in the table drawn up by Dr. Marcet, we do not find that the specific gravity, and the amount of the solid contents are in the same ratio. *Med. Chir. Trans.* ii. 381.

it. But these substances are, at the same time, very easily decomposed, if the temperature be either too high or too long continued, in which case, they become partially carbonated, and lose the properties that constitute their existence as albumen. In my earlier experiments I considered them as sufficiently dried when they were become brittle and transparent, while Dr. Marcet, in his analyses, pushed the heat until they were reduced to a "half charred state." I am of opinion that in my experiments too little heat was applied, and in Dr. Marcet's, too much. Although I have not been able to discover any standard that is unexceptionable, yet, the following experiments seem to approach to a decisive result. One of the most characteristic properties of albumen is its solubility in potash, a property which it loses when it has been carbonated; I therefore attempted to discover what degree of heat might be applied to albumen without its solubility in potash being destroyed. I found from several trials, that thin layers of albumen heated on glass, at a temperature of about 200°, were first converted to a transparent light yellow substance, afterwards they became semitransparent and of a reddish brown colour, a good deal resembling gamboge, while still more heat caused them to contract in bulk, and to assume a darker brown, with some mixture of grey or blackish parts. Three portions of albumen, respectively dried to these degrees, were each digested in potash at the temperature of the atmo-

sphere. The light yellow was quickly softened, and soon began to dissolve, the reddish brown underwent the same operation, only that it required a considerably longer space of time, the dark brown remained some days without being acted upon, and even when the potash was heated, a large portion assumed the appearance of blackish flakes, and seemed incapable of solution. I therefore considered the 3d portion, as having been exposed to too great a degree of heat, so as to have experienced a commencement of decomposition, while, on the other hand, the light yellow still retained a portion of water, which might be removed from it without destroying its characteristic properties. 100 grs. of albumen ovi brought to the light yellow state weighed about 17 grs.; when farther reduced to the 2d state described above, it weighed very nearly 15 grs.; and when still farther heated, so that it assumed the dark brown colour, its weight was farther diminished, but it was no longer soluble in potash. The 2d portion I considered as albumen in its state of complete dryness, for although it should appear, that not only this, but even the 3d portion, still retained a quantity of water, yet the water is essential to its existence as albumen, and cannot be removed without producing a complete decomposition, and change of its properties. I have not been able to discover any method by which this exact degree of desiccation can be produced, except by watching the process, and stopping it when this gamboge-like appearance

is produced, for a comparatively low temperature, if too long applied, produces a partial decomposition.

The methods by which we indicate the presence of albumen, when entering into the composition of a fluid, are the application of heat, or the addition of concentrated acids, alcohol, and metallic salts. I have, in my former essays *, given some account of the power of these reagents as tests of albumen, and also of their mode of operation. On this latter point I see no reason to alter my former opinion, that heat acts in a specific manner, which we are unable to explain; that acids and alcohol, in part at least, operate by the abstraction of water from the albumen; and that the metallic salts are properly precipitants, uniting with the albumen, and forming an insoluble compound. 40 grs. of the saturated solution of the oxymuriate of mercury †, added to 100 parts of albumen ovi, reduce the whole to a pulpy mass; and, if it be exposed to the heat of boiling water, the solid part separates in the form of a dense spongy curd, and leaves a fluid which is very nearly transparent; the separation is rendered more complete by the addition of an equal bulk of

* Edinburgh Med. Journ. i. 257; ii. 37. Nicholson's Journ. xi. 244; xiv. 140; Med. Chir. Trans. i. 47.

† If the crystals of oxymuriate of mercury are boiled in distilled water, the solution filtered when cold, and afterwards evaporated, it will be found that the water has taken up one-twentieth of its weight of the dry salt.

water. When the curd is removed from the fluid and dried, it becomes compact in its texture and friable, and if the heat be increased, it at length acquires a very solid consistence, and assumes a deep grey colour. It will be found upon an average to weigh 14 grs., which, deducting the weight of the oxymuriate of mercury, leaves 12 grs. for the albumen. The oxymuriate of mercury and the albumen will be found in this case to have very nearly neutralized each other; if to a portion of the residual fluid we add more oxymuriate of mercury, no effect is produced, proving that all the albumen is abstracted; and if to two other portions we respectively add the muriate of tin and caustic potash, there will, in the first case, be only a grey tinge communicated to the fluid, without any proper precipitate, and in the second, little or no effect. A minute quantity of oxymuriate of mercury added to these two portions will throw down copious precipitates, the muriate of tin of a grey, the potash of a yellow colour. But, although in this case the two substances seem to produce a reciprocal saturation, yet, I afterwards found that they were capable of uniting in a variety of other proportions, so that I was altogether disappointed in the expectation which I had originally formed, of being able to ascertain the proportion of albumen in a fluid, by finding the quantity of oxymuriate of mercury with which it was capable of uniting. The proportion mentioned above, one grain of the dry salt to 50 of albumen ovi, or to

six of dry albumen, appears, however, to be the most perfect compound, or that in which the substances form the closest union *. All my experiments lead me to conclude, that the united effect of heat and the oxymuriate of mercury is the most effectual means both of detecting the presence of albumen and of removing it. In order, however, to make an exact comparison of the effect of the oxymuriate of mercury and of muriatic acid, I took another 100 grains of albumen ovi, added 10 grains of muriatic acid, diluted with 120 grains of water, and kept the mixture for some time at a boiling heat. The whole was quickly converted into a pulpy mass of uniform consistence, nor was any fluid apparently separated from it after standing for twenty-four hours; it was then thrown upon a filtre, when a little clear fluid, which was strongly acid, passed through; 120 grs. more water were thrown upon the mass, and of this a part passed through the filtre, which was likewise considerably acid. The pulpy mass, being exposed to a gentle heat, was converted into a hard blackish substance,

* This proportion is considerably different from what I announced on a former occasion †; but I was not then aware of the variable nature of the compounds of albumen and the oxymuriate of mercury, and having, in the first instance, employed the proportions there stated, and found the substances neutralized, I concluded that they united in that proportion alone.

† Nicholson's Journ. 14. 42.

which weighed 11½ grs. The more quick and complete separation of the solid from the fluid part, which takes place when the oxymuriate of mercury is employed, gives that process a decided preference; the muriatic acid is also objectionable, in consequence of a large part, if not the whole of it, being left in the residual fluid.

As the white of the egg contains a greater quantity of albumen than any other animal fluid, the coagulum which is produced by heat is proportionably more firm; it may be divided by a knife, and the parts will accurately retain their shape. Coagulated albumen ovi contains few cavities or cells, and does not exhibit any appearance of fluid being mixed with it; but if it it be cut into small pieces, and placed in a funnel, some drops of a brownish liquid will ooze from it. If the coagulum be then boiled in about an equal bulk of water, the water will be found to have taken up a considerable quantity of matter, and by boiling the coagulum in successive portions of water, all the soluble part will be extracted from it. This fluid, which may be called the serosity of the egg, I found to resemble the serosity of the blood, and, like it, to consist of water, holding in solution a peculiar animal matter and some saline substances.

The serosity of the egg is so strongly retained by the coagulum, that the quantity which naturally

oozes from it is almost too small for examination. But I have found that if an equal bulk of water be added to the albumen, a fluid is procured, which appears almost as strongly impregnated as the serosity in its natural state. The fluid thus procured is slightly opake, but by remaining at rest for twenty-four hours, it deposits a slight sediment on the sides and bottom of the glass, and becomes transparent. It has a light brown colour, and an odour different from that of albumen; it is alkaline, but less so than the albumen from which it was extracted; it froths by agitation, and is slightly adhesive; it passes readily through a filtre, but the paper becomes stiffened, and acquires an additional weight. The serosity of the egg generally produces a slight precipitate with the oxymuriate of mercury, which appears to depend upon a very small quantity of albumen still adhering to it. That this small quantity of albumen is only accidentally mixed with the serosity, forming no essential part of its constitution, and that the great bulk of the animal matter in serosity is not albumen, is proved by the following circumstances: Albumen is detected with so much minuteness by the oxymuriate of mercury, that, if all the animal matter which is contained in serosity was albuminous, the fluid would be rendered perfectly opake by this reagent, whereas, the effect is in all cases slight, and in some scarcely perceptible. After the oxymuriate of mercury has produced all the effect of

which it is capable, if the fluid be evaporated, it will be found to contain a considerable quantity of animal matter, which, as the evaporation proceeds, renders it at length thick and adhesive. If the heat be increased, the animal matter becomes carbonated, and emits a specific odour, and is finally consumed. The tests by which we may detect the presence of this uncoagulable matter without decomposing the fluid, are the muriate of tin and the nitrate of silver. If muriate of tin be added to serosity, when no effect is produced by boiling the oxymuriate of mercury in it, an opacity gradually ensues, and after some time a precipitate forms and slowly subsides. This precipitate, I conclude, does not depend upon albumen, because albumen is detected with more delicacy by oxymuriate of mercury than by muriate of tin. The effect of the nitrate of silver is perhaps more decisive; if this reagent be added to a fluid which is deprived of its albumen by oxymuriate of mercury, no precipitation of animal matter ensues, but the whole fluid gradually assumes a dark brown colour. This depends upon the property which the nitrate of silver possesses of blackening animal matter when exposed to the light, a property which it exercises even when the particles are dispersed through a fluid medium. In order to determine more particularly how far the colouring of the fluid depends upon the muriatic salts, and how far upon the animal matter, I formed a solution of muriate of

soda and another of jelly, and dropped into each a little of the nitrate of silver. When added to the muriate of soda a copious precipitate fell down, which soon began to assume a grey or smoke colour, but the fluid itself remained perfectly transparent. When, on the other hand, the nitrate of silver was added to the jelly, no precipitate was produced, but the fluid became brown. When the solution of jelly was excluded from the light, no effect was produced by the addition of the nitrate of silver, but the change of colour commenced as soon as the light was permitted to act upon it.

The proportion which the four constituents of the white of the egg, water, albumen, uncoagulable matter, and salts, bear to each other, may be ascertained by first evaporating the substance to a state of perfect dryness, when we learn the weight of the water; by digesting a quantity of coagulum in successive portions of boiling water, so as to carry off all the soluble matter, and then drying the coagulum, the proportion of this substance may be ascertained; lastly, by evaporating to dryness*

* In evaporating the uncoagulable matter, if the substance be exposed to a heat of about 250°, its colour gradually becomes deeper, and the consistence more solid, until it assumes the appearance of a black shining mass; if the heat be still continued it begins to form blisters, from which a gas exhales, that evidently arises from the commencement of decomposition; just before the appearance of these air-bubbles I consider the point of complete dryness. It is still capable of being softened in warm water, and retains its specific odour and other characteristic properties.

the water employed in washing the coagulum, and by calcining the residuum, the proportion of the uncoagulable matter and the salts may be estimated. The following is the result of the experiments which I consider the most accurate:

Water - - - - - - - - -	85 *
Albumen - - - - - - -	12
Uncoagulable matter - -	2.7
Salts - - - - - - - - -	.3
	100.0

The nature of the uncoagulable matter of the albumen ovi can only be examined in conjunction with the saline bodies which enter into the composition of the white of the egg. When the water in which the coagulum has been washed is gradually evaporated, a soft mass will be left, of a dusky brown colour, and of a specific odour, totally unlike that of albumen; it is adhesive, but not strongly so; when not too much dried, and when only a moderate heat has been employed, it may be redissolved in water; but if the heat be considerable it is reduced to a skinny or membranous substance, which, although softened and swelled out by water, seems to be scarcely soluble. If, how-

* This estimate differs considerably from the one which I formerly made, but I hope it will be found more correct. I shall not occupy the time of the Society in attempting to account for my former errors; I shall think it sufficient to endeavour to correct them.

ever, this membranous substance be rubbed with water in a mortar, it is at least capable of being suspended in the fluid, and, perhaps, partially dissolved. The effect of reagents upon uncoagulable matter is quite different from that upon albumen; oxymuriate of mercury has no effect; nitrate of silver blackens, without precipitating it; muriate of tin precipitates it very gradually, while acetate of lead immediately unites with it, and, forming a white dense substance, leaves the fluid perfectly transparent and without any impregnation. The action of the acetate of lead is, in part, upon the salts contained in the uncoagulable matter, but that it is not entirely so is evident from examining the state of the fluid after the action of the acetate; from comparing the action of the acetate of lead upon the fluid with that upon a similar solution of salts, without any animal impregnation; and also by comparing the effect of the acetate with the super-acetate of lead; the first throws down both the salts and the animal matter in the form of a dense white mass, and leaves the fluid transparent; the latter precipitates the salts and some part of the animal matter, rendering the fluid opake, and permitting a precipitate slowly to subside from it.

The saline bodies contained in the albumen ovi appear to differ both in their quantity and their quality from the salts of the blood. According to the very accurate experiments of Dr. Marcet, the amount of

saline matter in the different albuminous fluids which he examined is very nearly the same, whatever be the variation in the proportion of the albumen; a fact with which the results of my experiments correspond, so far as respects the albuminous fluids procured from the human body. The quantity is nearly 1 part in the 100 of the entire fluid, of which nearly three-fourths consist of muriate of soda, one-fifth of uncombined soda, together with a small quantity of sulphates and phosphates. The whole amount of salts in albumen ovi appears to be scarcely 1 part in 300; the proportion of the sulphates to the muriates is considerably greater, and there is a much larger quantity of lime contained in the mass. When the ashes of albumen ovi have been digested in hot water, its surface is covered with a thin crust, which dissolves with effervescence in muriatic acid, and is precipitated by oxalate of ammonia; the solution of the salts appears to be affected in about an equal degree by the nitrate of silver and the muriate of barytes. The quantity of uncombined alkali seems to be about the same in albumen ovi as in the serum of the blood.

The above account of the nature and properties of the albumen ovi will prepare us for examining the other albuminous fluids, and, in the first place, the serum of the blood, that from which all the rest are derived. I have already submitted to the So-

ciety my opinion upon this subject, at considerable length, on two different occasions, so that at present I shall only make a very few observations respecting it. It will be unnecessary to offer any additional arguments to prove that the blood contains no jelly, confirmed as my experiments have been by those of Dr. Marcet*, nor do I conceive that there is less certainty respecting the existence of an animal substance in the blood different from albumen. This substance, which I formerly styled mucus, and which Dr. Marcet has more lately described under the title of muco-extractive matter, seems in all respects to resemble the uncoagulable part of albumen ovi. The principal point on which I feel disposed to dissent from the authority of Dr. Marcet is concerning the amount of the solid contents of the serum, which I estimate at about two per cent. more than he does. This difference evidently depends upon the greater degree of desiccation which he employs, and upon which I have already animadverted in the commencement of this essay; this remark applies both to the coagulable and to the uncoagulable part of the blood†. From the average

* And I may now add of Prof. Berzelius.

† In my former paper I gave a lower estimate than usual of the specific gravity of serum, in consequence of my having found it to be so, in the only cases in which I had an opportunity of examining it in the state of health. Dr. Marcet has given the specific gravity of five specimens of human serum; the first, which may be considered

of those experiments on which I can place the most confidence, I should estimate the composition of the blood as follows,

Water - - - - - - -	80
Albumen - - - - - -	10
Uncoagulable matter - -	1
Salts - - - - - - - - -	1
	92

I have, at different times, been favoured by my medical friends residing in Liverpool, with not less than thirty specimens of albuminous fluids, which I have submitted to chemical analysis. After rejecting those which were mixed with extraneous substances, those that had undergone a partial decomposition, and others, the results of which were injured by unsuccessful attempts at new methods of analysis, I have an account of twelve different fluids, which, on some account or other, I think worthy of being laid before the Society. In order

considered as taken from a healthy subject, nearly agrees with my estimate. The second, third, and fourth, were obviously diseased, and no mention is made of the condition of the fifth patient. I acknowledge that I was premature in forming a general conclusion from such scanty premises, so that I would consider the point as requiring additional facts before it can be determined. As to the experiments which I made upon the salts of the serum, I consider them entirely superseded by the researches of Dr. Marcet, whose accuracy in minute analysis entitles him to perfect confidence.

SYNOPSIS OF ALBUM

	Fluid from Spina bifida. 1805. See Nich. 14.	Fluid from ascites. 1808—1810.	Fluid fro Mat
1. Physical Properties.			Fille quantity which su slowly.
a. Specific gravity.	Nearly t of water.		
b. Color.	None.	Different shades of yellow.	
c. Consistence.	Slightly a hesive.	Adhesive.	
d. Odor.	None.	Albuminous.	Albun
e. Alkalescency.	None; p haps very slight.	Very obvious.	
f. Miscellaneous circumstances	Slightly opake.	Readily miscible with water.	The readily with wat
2. Spontaneou changes.		White sediment deposited, alkalescence increased, odor very nauseous.	
3. Coagulability.	Opacity in creased by bo	Complete coagulum by heat, rather	Coagul boiling.

to avoid repetition, I have drawn up the results in a tabular form, and as the earlier analyses were made some years ago, and of course with less accuracy than the later ones, I have placed them in the order in which they were performed, prefixing the date to each.

[*See the Table annexed.*]

In the four first of the above analyses, I am aware that the degree of desiccation was not sufficient, and therefore that the amount of solid contents is estimated too high; in the later ones, however, since the year 1808, I have fixed upon the standard which I mentioned in the commencement of this paper. I have gradually diminished the number of re-agents employed, as I became better acquainted with their operation; and in the synopsis I have only selected those which seem to lead to some important conclusion. The account of the liquor amnii is necessarily imperfect, in consequence of the impure state of the fluid; but I have inserted it in the table, as the experiments were sufficient to prove its albuminous nature. I have, at different times, had several specimens of the fluid of ascites, and I have found them, as might be expected, to differ in their sensible properties, and in the quantity of their solid contents; but the nature of the fluid is always the same: I have taken the average of those analyses which I

thought the most complete. The fluid taken from the knee joint, and that found in the stomach, could only be examined in a rough manner; but the experiments were sufficient to prove that they were albuminous, and I think it important to establish the fact, because it would seem that membranes, which in the healthy state secrete a mucous substance, have the secretion stopped by the process of inflammation, and in its stead transude an albuminous fluid. The analyses of serum and of albumen ovi, were among the first which I performed; but in the annexed table I have disregarded the earlier experiments, and have employed the results of those only which were performed during the last summer and autumn. The most important, and to me a highly gratifying circumstance, respecting the above experiments, is their near coincidence with those of Dr. Marcet, although mine were, for the most part, performed before his; yet, except some of the earliest, which had been published, the rest were quite unknown to him. Allowing for the greater degree of desiccation which he employs, and for the much greater minuteness with which he examines the saline impregnations, our agreement is so remarkable as to prove, not merely the general accuracy of the experiments, but the similarity of the same species of albuminous fluids when derived from different subjects.

The next class of fluids are those to which I pro-

pose to give the name of *mucous*. I have adopted this term, both as the one generally employed, and also as conveying a sufficiently distinct idea of the substances described. They may be defined viscid or tenacious fluids, capable of being drawn into threads, but not of being poured in the form of drops, containing a great quantity of water, but not readily miscible with any additional quantity. Saliva may be adduced as a specimen of them: and to the same class belongs the nasal mucus, the mucus found in the stomach, that occasionally discharged from the bladder, and that from the intestinal canal. These fluids differ from the albuminous, in being principally composed of a substance which is not exactly similar to any thing in the blood; and on this account, they are to be considered as the products of secretion, rather than of transudation. They also differ in another circumstance, which is of considerable importance in a pathological point of view; that whereas the albuminous fluids seem to be all confined in close cavities, the mucous fluids, in their natural state, are poured out into passages that communicate with the external surface of the body. It is not possible to collect and examine these fluids in the same manner with the albuminous: they are secreted gradually, and are discharged as they are secreted: they are united to variable quantities of water; and in most cases, they are mixed with extraneous bodies before they are discharged. On this ac-

count, and because I have had a smaller number of them for examination, I have not been able to ascertain their nature with nearly as much accuracy as those of the former class. By the assistance of my medical friends, I have obtained about eight or ten of these fluids, but there are only four, the account of which I shall lay before the Society: the saliva, the fluid found in the stomach, a peculiar fluid discharged from the bladder, and a fluid obtained from a patient labouring under ascites.

The saliva was one of the first fluids which I attempted to analyse, and in all essential points I retain the same opinion respecting its nature which I originally adopted. It consists of a variable proportion of water, of two animal substances, one which, in its chemical nature, resembles coagulated albumen, of another which is uncoagulable, and of salts. The physical properties of the fluid seem to depend upon the former of these substances, so that we ought perhaps to restrict the term *mucus* to this body, unless it may be thought more prudent to banish altogether from physiology a term which has been used in so indefinite a manner, and applied to such a variety of substances. From the circumstance of its being united to a large quantity of water, while at the same time it is very difficult to unite an additional quantity to it, we must suppose that it possesses a certain degree of organization; and as its chemical properties are the same

with those of membrane, it is perhaps the first step towards the formation of this body. From its half organized state, it is less affected by different re-agents than albumen; but after a sufficient length of time, it exhibits the same attraction for the oxy-muriate of mercury and for tan, and in the same manner it has its union with the former of these substances promoted by heat. The other animal substance in saliva I consider as being very nearly, if not entirely, similar to the uncoagulable matter in albumen ovi and in serum. As it is much more readily soluble in water than the former substance, the proportion which they bear to each other in saliva is very various; but, upon an average, it will be found to exist in a much greater proportion in saliva than in the blood *.

With respect to the fluid of the stomach, I shall only observe that its basis seems to be a coagulated albumen similar to that in the saliva; but it is in all cases so mixed with other matters, that its properties cannot be ascertained with any great degree of accuracy, nor can we determine how far any varieties found in it depend upon the fluid itself, or how far upon substances accidentally mixed with it.

* It was from the circumstance of having first distinctly ascertained its existence as one of the constituents of saliva, and also from some resemblance to vegetable gum, that I gave it the name of *mucus*, a name which I now think not appropriate.

The two remaining species of mucous fluids I shall describe more at large, as they both of them appear to lead to some interesting conclusions. The substance voided from the bladder consisted of a fluid bearing a general resemblance to urine, with a more solid matter floating in it. The two substances were separated by decantation, and I first made some experiments upon the fluid part. It was of a dirty brown colour, of a sharp, but not putrid odour, strongly alkaline, of the specific gravity of 1.125, homogeneous, adhesive, and readily miscible with water. A portion of the fluid was kept for some time at the boiling heat, it was rendered more opake, and some small flakes were formed in it; the oxymuriate of mercury being added to it while hot, produced a quantity of hard dense flakes, and seemed to separate the whole of the adhesive matter. A portion of the fluid had an equal quantity of the decoction of galls added, when a degree of precipitation was produced. After some time the upper part of the fluid grew black, and by degrees the blackness extended through the whole. When poured into water, it remained suspended in the water in the form of a black pulpy mass. The prussiate of potash did not produce any change of colour in this fluid. Both the acetate of lead and the muriate of barytes threw down very copious precipitates, and left the fluid transparent. The solid part was next examined: it seemed to be com-

posed of a mucous substance, in the form of a long cylinder, of about an inch in diameter. When lying in a basin it resembled a quantity of the convoluted small intestines; when poured from one vessel to another it was quite continuous, and could only be divided by scissars. It was not miscible with water except by strong agitation in a bottle, when it became broken down, and seemed partly dissolved and partly suspended. It was strongly alkaline, and it retained the alkalescence after being repeatedly washed in water. A quantity of this mucous solution was kept for some time at the boiling heat, and became rather opake. A portion of it was then agitated with acetic acid, until the alkali was neutralized; a considerable effervescence was excited, and being afterwards heated, a partial coagulation took place. When the mucous substance was boiled with the oxymuriate of mercury, a number of dense hard flakes was separated, and a fluid was left nearly transparent, and in such a state as to pass readily through a filtering paper. Muriatic acid, when added in excess to the mucous substance, produced a very copious effervescence, and threw down a precipitate in the form of hard dense brown masses, leaving the fluid quite transparent. A quantity of the mucous matter was slowly evaporated, and left a residue amounting to $\frac{1}{12}$ of the whole. It was a tough membranous substance of a brown colour, with a degree of the urinous odour, and slightly attracted moisture from the

atmosphere. Water, by standing on it for twenty-four hours, dissolved a brown substance, and left the membranous matter of a dirty grey. This water was evaporated, and left a substance, which in colour and odour strongly resembled urea, but which differed in not exhibiting a granulated structure. Nitric acid acted on this substance in the same manner as on urea. The evaporated mucus had muriatic acid digested upon it; it was converted into a carbonaceous matter, which had an extremely fœtid odour, and which appeared mixed with a pitchy substance. This pitchy substance was soluble in water, and tinged blue by the prussiate of potash. By the test of the sulphate of copper the alkali in the mucous substance appeared not to be ammonia. From these experiments we may conclude, that the matter discharged from the bladder consisted partly of a mucous substance combined with an alkali, and of a fluid which also contained an alkali, together with albumen and urea. The mucous substance was peculiarly dense and tenacious, and was so strongly united to the alkali as not to be separable by water. This mucous substance was not readily coagulable, which seemed to be, in part at least, occasioned by its combination with the alkali. There was a small quantity of iron attached to the mucus. If we suppose that the fluid which is secreted in the healthy state, from the interior of the bladder, is of a mucous nature, it would appear that, in this instance, not only is the natural secretion very much increased in quan-

tity, but, together with it, a portion of albumen has transuded; and it becomes an interesting pathological question, in what order these effects are produced, and what is their efficient cause.

The other mucous fluid of which I propose to give an account, that from ascites, was sent me by a medical friend, with an intimation that he suspected the dropsy to be encysted, both from its symptoms, and from the circumstances which occurred during the operation. The fluid was opake, brown, and tenacious, not readily miscible with water, neither acid nor alkaline, of an unpleasant odour, not albuminous, and of the specific gravity of 1.029. When equal parts of the fluid and of water were strongly agitated together, they seemed to unite; but after twenty-four hours a considerable part of the solid matter had subsided. By evaporation eleven per cent. was left of a brown brittle substance, which was partly redissolved by rubbing it with hot water. When the fluid was exposed to the boiling heat, the whole became converted into a white coagulum, which contained very few air-cells, and in consistence was like the substance of the brain. The oxymuriate of mercury acted upon it slowly, but after twenty-four hours, it converted the whole into a white creamy fluid. The nitrate of silver almost immediately produced a number of dense flakes, some of which soon began to grow brown, and at length assumed almost a black colour. Muriatic acid produced a

number of flakes of coagulum, of rather a loose texture. Caustic potash rendered the fluid less opake and tenacious, and of a browner colour. When the oxymuriate of mercury was heated in the fluid, the animal matter was gradually converted into flakes, and the fluid was left transparent. This residual fluid being evaporated, a considerable quantity of a dark animal matter was left, which, by continuing the heat, was reduced to a charcoal. After being for some time exposed to the atmosphere, the substance acquired a very nauseous odour, a sediment fell to the bottom, composed partly of flakes, and partly of a creamy substance; the supernatant fluid was transparent, and was become alkaline; its colour was not affected by the sulphate of copper. I have selected the above from a number of experiments which I performed upon this substance, for the purpose of showing, that although it possessed the characteristics of a mucous fluid, in being tenacious and not readily miscible with water, yet it retained many of the properties of albumen. An important question here presents itself: was this fluid originally poured out in the albuminous state, as in common ascites, and afterwards became mucous, or was it originally effused in the condition in which we obtained it? To this question I am unable to reply; it will be a point highly deserving of future examination, whether the fluid of encysted dropsy is different from that of the common kind.

There is still a third class of animal fluids which should next come under our consideration, the peculiar characteristic of which consists in their containing particles visible to the naked eye. I have examined a few of these fluids which have been discharged from tumors situate both in muscular and in glandular parts. One of them which I had an opportunity of examining with a good deal of minuteness, was procured from a confined tumor on the thigh; its basis consisted of an albuminous fluid, and the particles were composed of a substance very similar to spermaceti, both in its physical and chemical properties. Like this substance it exhibited a considerable lustre, which it communicated to the fluid, so that when it was gently agitated, it gave to it a waved or glossy appearance, not unlike satin. As the fluid part was miscible with water, while the particles were insoluble, they were readily separated, and retained their lustre for some time after being dried. The fluid which Dr. Marcet examined, from a tumor in the thyroid gland, was evidently of this class*.

These three classes of animal fluids, the *albuminous*, the *mucous*, and the *particled*, (if I may be permitted to use so uncouth a term) are all that it seems at present necessary to establish, but I am aware that future discoveries may add new ones, or alter the arrangement of those that exist.

* Med.-Chir. Trans. II. 374.

This paper is, however, already extended to so great a length, that I shall close this part of the subject, and proceed to offer a few practical directions on the method of analysing animal fluids.

The first object is to examine the physical and sensible properties of the entire fluid, its colour, odour, specificgravity, consistence, state of transparency, alkalescency, and homogeneousness; if not homogeneous, we are to observe whether it contains small particles diffused through a transparent medium, masses, or flakes, or whether the whole be opake. Its miscibility with water is next to be examined; if miscible readily in all proportions, it is albuminous; if not so, although transparent and homogenous, it is mucous. The spontaneous changes are to be noticed. Portions of the fluid may be set aside for observation, some exposed to the atmosphere, some excluded from it. At different intervals, they must be examined as to their sensible changes, the alteration in consistence, colour, odour, &c.; the state of alkalescency is to be watched, and if an alkali be developed, we must examine by a salt of copper whether it be ammonia. Sometimes a fluid becomes highly putrid without being alkalescent, and sometimes when it becomes alkalescent, the alkali is not ammonia. The degree of alkalescence may be in some measure ascertained by forming a standard acetic acid, and comparing the weight of it necessary to saturate a given weight of the fluid in question, with

that of a standard alkaline solution. We are next to examine the effect of heat upon the fluid, whether it produce coagulation, and in what degree. Is the whole converted into a solid so as to bear being cut with a knife? or is the fluid merely rendered pulpy, or only opake? The coagulation is best observed by placing the fluid in small cylindrical jars in boiling water. We are now to evaporate a portion of the fluid, to ascertain the amount of its solid contents: this process is best performed in small glass capsules, the weight of which is previously ascertained; during the evaporation we must notice the change which the substance undergoes in its sensible properties, particularly in its colour and odour.

The different re-agents may now be employed; and first, those which indicate the presence of albumen. Of these the oxymuriate of mercury is the most delicate, and by boiling it with the fluid, the most minute portion may be detected. Muriatic acid is a less delicate test, but we may observe its effects, as it has been much employed by other chemists. Besides these two re-agents, there are several salts, both metallic and earthy, which coagulate albumen, and which may occasionally be employed. When all the albumen has been removed, we may add to the fluid the decoction of galls, for the purpose of searching for jelly. The uncoagulable matter is now to be detected by means of the nitrate of silver and the muriate of

tin, as described in the former part of this essay. For this purpose also the acetate and the super-acetate of lead may be employed, by observing the effects of the acetate, and especially, by comparing it with that of the super-acetate, the presence of the uncoagulable matter will be distinctly indicated.

Our next business will be to learn the proportion in which the different ingredients of the fluid exist. The amount of the whole of the solid contents, and consequently of the water, has been ascertained by evaporation. To find the quantity of albumen, we must boil the fluid with the oxy-muriate of mercury, by which the albumen will be separated in a solid form, and after being washed with water to carry off the uncoagulable matter and the salts, may be dried; the water which had been employed in washing it must then be evaporated. After having reduced the residuum to dryness, and ascertained its weight, it must be calcined, and the ashes lixiviated, and this water again evaporated. In this way, we shall obtain a series of quantities, from which the respective proportions of the different constituents may be estimated with considerable accuracy. Lastly, the mass of salts must be analyzed; but on this topic I shall forbear to offer any remarks; the subject has been already handled in so superior in manner by Dr. Marcet, that I shall leave it entirely in his hands.

In a paper like the present, which consists very much in general views, many particular parts must necessarily be treated in a cursory manner. These deficiencies it will be my object to supply as occasions may present, and I shall hope, from time to time, to lay the results of my investigations before the Society.

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* Since this paper was completed, an opportunity occurred to me of examining another specimen of a *particled* fluid, the properties of which I shall detail. The fluid was discharged by Mr. Forshaw, one of the surgeons to the Liverpool Infirmary, from a tumor situated among the muscles of the thigh. The substance in its entire state was opake, but by standing, a sediment subsided from it, and left the fluid part transparent, and of a light lemon colour. It was adhesive, and readily miscible with water, slightly alkaline, and of the specific gravity of 1.02. By boiling it became quite concrete, although the coagulum was less firm than that from the serum of the blood, and it retained a yellowish tinge. When cut into small pieces, the serosity oozed out from it in the usual manner, and like the serosity of the blood, was found to consist of a minute quantity of albumen, mixed with different saline substances, and the uncoagulable matter. By slow evaporation of the entire fluid, about $\frac{1}{14}$ was left of a dry residuum. The action of different re-agents upon the fluid, showed it to be exactly of the same nature with the serum of the blood.

The *sediment* was obtained apparently in a state of purity; it had a thick creamy consistence, and, upon a close inspection, was found to consist of a number of white shining scales. When poured from one vessel to another, it presented the appearance of half-melted spermaceti, and when it was agitated, presented the same glossy or waved appearance. It was perfectly white, and had an odour a little resembling pus; it was strongly alkaline. Boiling converted it into a firm coagulum, which was considerably

more dry and friable than that formed from albumen. The *sediment* did not appear to be at all soluble in water; but by agitation, the particles were diffused through the fluid, and gave to it the silky appearance described above. By degrees the particles separated themselves from the water, and formed themselves into a large globular mass, which was partially suspended in the fluid. Neither the mineral acids nor tan appeared to have any action upon the *sediment*. The oxymuriate of mercury, when added to the substance, entirely removed its peculiar odour, and also changed its colour to a dirty grey; but it did not seem to alter its consistence or texture. The nitrate of silver rendered the substance more solid, and also gave it a grey colour.

The *sediment*, after being washed in successive portions of water, was separated by a filtre and dried. It had a slightly unctuous feel, was partially softened by heat, produced a greasy stain on bibulous paper, and burned with the emission of smoke and an animal smell, leaving behind a spongy coal. When digested in potash it was partially dissolved, and formed a saponaceous fluid. Ether and alcohol, when boiled with the dried sediment, produced scarcely any visible effect; but upon evaporating the fluids, a thin film was left behind, proving that some degree of solution had taken place.

From these experiments, it appears that the *sediment* consists of a peculiar substance, the nature of which appears to be intermediate between albumen and wax, and which may therefore be called albumino-cerous matter.

Knot's-hole Bank, near Liverpool,
June 11, 1813.

OBSERVATIONS

ON THE COMPARATIVE

PREVALENCE, MORTALITY, & TREATMENT

OF

DIFFERENT DISEASES;

ILLUSTRATED BY ABSTRACTS OF CASES WHICH OCCURRED TO THE AUTHOR AT ST. THOMAS'S HOSPITAL, AND IN HIS PRIVATE PRACTICE, EMBRACING A PERIOD OF TWENTY YEARS.

By Sir GILBERT BLANE, Bart. M.D. F.R.S.

PRESIDENT OF THE SOCIETY.

Read July 27, 1813.

THE history of diseases in different ages as a branch of general knowledge deeply interesting to the human race, would be sufficiently important to command the attention of the intelligent part of mankind, independently of its application to professional purposes. A little reflexion, however, will shew that such knowledge is highly conducive, and even indispensable to the cultivation of practical medicine, and the regulation of medical police.

It is a remark of M. de Buffon in the preface to his Natural History, that all our observations on nature are suggested by comparison. He might

have added, that all practical deductions, whether in common life or in physical science, are grounded upon it, corrected and extended by it. As all practical researches ought to be built on an induction of facts, single objects or events are of little value but in so far as they stand related to others: and when numerous objects and events present themselves in uniform combination, it is only by varying them and comparing them with others that useful inferences can be drawn from them, and that the relation of cause and effect can be distinguished from casual coincidence or simple succession. Those physical agencies, on the discovery of which all practical knowledge is built, and those analogies in which all suggestions and rational conjectures originate, can only be ascertained by an enlarged view of nature, which, by enabling us both to elicit new truths and to adapt means to ends, may be considered as at once the instrument and the light by which we work.

It could easily be shewn how much more applicable these remarks are to medicine than to any other art or science, from the peculiar intricacy and complexity of the objects about which it is conversant, and the more numerous * sources of

* The like sentiment is happily expressed by Bacon, in the following passage; "Subjectum istud Medicinæ (corpus nimirum humanum) ex omnibus, quæ Natura procreavit est maximè capax remedii, sed vicissim illud remedium maxime est obnoxium errori.

fallacy and error incident to it, no less from the superstition and credulity of rude ages, and of the ignorant and vulgar in all ages, than from those hypothetical and spurious reasonings engendered by false physiology and pathology, and by the perverted application of general science, in the learned ages.

But as abstract disquisition does not belong to this place, and as I have elsewhere * attempted an outline of this subject, I shall pass to the proper matter of this communication.

Impressed with a high opinion of the advantages derivable to the art of physic from comparative views, I have endeavoured to bring an humble contribution to the medical history of this age and country, by giving some account of one of the largest hospitals in this metropolis, to which I was physician for twelve years; and having kept notes of all the cases that occurred to me during the greater part of that time, and also in my private practice at all times, I propose to submit to this Society some of the principal results of the former from 1784 till 1794, and of the latter from 1795 till 1805.

errori. Eadem namque subjecti subtilitas et varietas, ut magnam medendi facultatem præbet, sic magnam etiam aberrandi facultatem." *De Augmentis scientiarum*, liber. iv. cap. ii.

* See Preface to the third edition of Observations on the Diseases of Seamen.

But with a view to comparison it will be necessary to carry back our researches into former times; and for this purpose I shall endeavour, from such imperfect lights as professional writings, historical records, and the bills of mortality afford, to make a brief recital of the most remarkable diseases which have arisen and have since disappeared in this country in the course of time, of those which have arisen but have not disappeared, and also of those which have prevailed with various degrees of frequency and fatality at different periods; concluding with an enumeration of those that have been more prevalent in our times than in former ages.

To the first description belong the leprosy and the sweating sickness. The leprosy became general all over Europe in the twelfth century, and was supposed to have been imported by the crusaders. It became extinct, and was again imported into England, but has not been known in Europe, since the beginning of the sixteenth century.

The sweating sickness was supposed to have been imported by the army which invaded England under Henry VII. It prevailed from 1485 till 1551, and in some years during one month in Autumn, with a fatality approaching to that of the plague.

To the second description belong small-pox,

measles, and perhaps all the other specific contagions, and the venereal disease; and though the exact periods of the origin of each of these cannot be ascertained for want of historical records, there is every reason to believe that there was a time when none of them existed.

To the third description belong the plague, the dysentery, intermittent fevers, typhous fever, the small-pox, the venereal disease, the scurvy, and the rickets. It is doubtful whether the plague ought not to be referred also to the former list, for though it resembles the plague of the ancients in point of fatality, its characters are quite different from those described by Thucydides and other authors, so that it was perhaps generated in the middle ages.

The first mention of the plague in the English history is in the year 430, the last year in which it was epidemic here was in the year 1665, and the last year in which mention is made of it in the bills of mortality is 1679.† With regard to dysentery and intermittent fevers, there is the most incontrovertible evidence from the bills of mortality, from professional and other writings, of the great and rapid decline of these diseases. It appears from the bills of mortality, that the annual deaths from bowel complaints, of which dysentery was the principal, fluctuated from one thousand to two thousand, some years amounting to upwards

† see p. 475.

of four thousand in the seventeenth century; that they fluctuated from one thousand to one hundred in the first part of the eighteenth century, and from one hundred to twenty in the latter half of it. And I find, from inspecting those bills for the first ten years of the present century, that the number of annual deaths under this head has been on an average 22.8. The bills of mortality are justly chargeable with great want of discrimination; but the differences here are so wide, and the reduction of numbers so regular, that there can be no doubt of this, as a general truth.

With regard to agues, the bills do not afford us satisfactory information, this disease being blended with continued fevers, till the beginning of the eighteenth century. But we learn, both from the writings of physicians and others, that they were extremely prevalent in London in the seventeenth century. They have continued to decline through the eighteenth century; but their mortality during this period is not to be considered as so fair a test of their prevalence as in former ages, for we must presume that the introduction of the Peruvian bark as a remedy has had a sensible effect in reducing the number of deaths. In 1728, the number of deaths from this disease is reported at forty-four; in 1729, twenty-seven; in 1730, at sixteen. During the first ten years of the present century, the number of deaths under this head has been, at a medium, only four.

In typhous fever, by which is understood that which takes its origin from accumulated filth and want of ventilation in jails, hospitals, ships, the habitations of the poor, and the close buildings of great cities, has probably been in all ages and nations, at least in cold and temperate climates, the most frequent form of continued fever*. But these causes being interwoven with the common habits and occurrences of life had escaped the observation† of medical authors till about the middle of the last century. The facts relating to this subject were first clearly stated by Pringle and Lind. No example more convincing than this can be adduced of the substantial benefit of the lights of knowledge; for the measures which have been successfully taken for the prevention of this disease, and which are peculiar to our own times, have been founded on the knowledge of its remote cause.

The mitigation of the venereal disease has arisen from superior habits of cleanliness and superior

* It seems to be a general law of animal nature at least among the *mammalia*, that the accumulation and stagnation of the exhalations of the living body produce disease. The glanders of horses arise only in large stables, and the distemper of dogs, in kennels. During the American war, it was proposed to send live sheep from England across the Atlantic. In a few weeks, in consequence of being crowded in a ship, they all died of a febrile disorder. +

† This is founded on the principle stated in the first page of this article.

+ see p. 475.

skill in the cure; that of the small-pox from inoculation and vaccination.

With regard to the scurvy, by which I mean a disease having the characters of the sea-scurvy, a considerable mortality is assigned to it in the London bills of the seventeenth century. From the ambiguity of the term which is loosely applied also to cutaneous affections, we should be at a loss to know, whether it is the sea-scurvy or not; but in the first place, it is not likely that cutaneous diseases should be liable to so much mortality*, and next, we know from the description which Willis has given of it, that a disease having the genuine characters of the sea-scurvy, did prevail in London in that age, though now entirely extinct. The scanty supply† of fresh vegetable food for man, and winter fodder for cattle, which made it necessary to slaughter and salt them for winter use; the greater uncleanness and dampness of the streets and

* The deaths under the head of scurvy, in the seventeenth century were seldom under fifty, frequently, as high as ninety, and in the year of the plague they amounted to one hundred and five. They declined rapidly at the end of that century, and may be said to have vanished ever since.

† Towards the beginning of the sixteenth century, the art of gardening in England was in so low a state, that Queen Catharine of Arragon could not procure a salad until a gardener was sent for from the Netherlands to raise it. It appears that the most common articles of the kitchen-garden such as cabbages, were not cultivated in England till this reign.—See Anderson's History of Commerce.

houses, accounts for the existence of it in those times. It is now nearly as rare at sea as at land; in consequence of the improved diet, cleanliness, and the general supply of lemon-juice in the navy.

With regard to the rickets there is much ambiguity, for though it is first described by Glisson, and though it first appeared in the bills of mortality in 1634, there is great reason to believe, that it existed before that time, and the name of it in the bills is probably blended with other denominations of disease. There is no doubt, however, of the great decrease of it in common with the other complaints of children, which rendered the mortality so much greater among them formerly than at this time.

To the last description, namely, those which are more prevalent in modern times than formerly, belong the scarlet fever, consumption, gout, dropsy, palsy, apoplexy, lunacy, and generally all those diseases of which the brain and nerves are the seat, and of which the increased prevalence in this country in our times, is owing to there being a much greater proportion of the population who live independent of bodily labour than in any former age, and perhaps, something may be ascribed to the general use of tea and coffee. The scarlet fever has been known in all ages. It is described exactly by Paulus Ægineta, and there are several distinct notices of it in the more early mo-

dern authors; but in as far as we can gather from the records of Physic, it is only in the last seventy years, that it has prevailed epidemically in different countries of Europe and in America. In this country it generally arises and prevails most in seminaries of education, and it is perhaps to the greater extent to which this mode of education has been carried in our times, that we are to ascribe its greater frequency and prevalence, and its being a disease of which subjects under puberty are peculiarly susceptible, is in favour of this opinion. The other diseases under this head, are plainly referrible to the increased means of luxury, the improvements in commerce, civilization, and the refinements of life.

The diseases chiefly incident to savage and barbarous nations are *fevers, fluxes, and rheumatisms. One cause of their being exempt from many diseases, is, probably, the loss of all those children in infancy who are weak and sickly, whereas, in civilized times, those who are saved by good nursing and medical skill, become the victims of other diseases in more advanced life. This may be one cause, at least, of the modern increase of consumption†.

* See Rush on the Disease of the American Indians.

† For the proofs of the increase of consumption, the reader is referred to the able and ingenious work of D. Woolcombe, intitled, Remarks on the Frequency and Fatality of Different Diseases. London, 1808.

But upon the whole, I believe the present generation may congratulate itself on its improved condition with regard to those great sources of human misery, epidemic and endemic disorders.

The remote causes of all predominant disorders may be referred to ~~three~~ four general heads, the vitiated exhalations and secretions of the living human body, the noxious exhalations of the earth, ~~and~~ & the vicissitudes of the seasons depraved habits of life. The first includes the plague, the specific contagions, typhus, dysentery, leprosy, and the venereal disease; the second consists of intermittent and remittent fevers*; the third comprehends palsy and other nervous affections, gout, dropsy, scurvy, and rickets.+

There are many complaints of which we are at a loss to make a comparative statement for want of records. As there are no works, except such as are of a modern date, which profess to give a general account of all diseases, and as there is a great chasm of information in the dark ages, we are at a loss to know whether certain diseases prevailed or

* The several species of morbid matter generated by the living body, and that which is exhaled from the earth, may be viewed in the light of poisons; and, as the same person must frequently be placed under the influence of both at the same time, certain modifications and varieties of disease must arise from this combined influence. This might be plausibly illustrated by reference to the nature and causes of several diseases, but it would lead into too wide a field of speculation and conjecture to dilate now upon this subject.

+ see p. 475.

not in different periods and countries, and at what exact æra new diseases arose*. It is enough to know practically, that all the three remote causes, namely, contagion, noxious exhalations of the soil, and depraved habits of life, are by their nature very much subject to human controul. This affords us great encouragement in our endeavours to combat them. The counteraction of typhus by means of cleanliness and ventilation; of the small-pox by vaccination in our times; and of agues in the country by the draining of marshes, and in town by the construction of sewers, and the cleansing of the streets in the seventeenth and eighteenth centuries, are undeniable proofs of the power of human art in preventing and extinguishing diseases. The counteraction of the third class of causes consists in resisting the propensities to sensuality, indolence, and effeminacy, by good moral habits and self-command.

The only other important particulars that remain to be noticed, regarding the artificial means of maintaining health in modern times, is the use

* There are obscure notices respecting certain diseases which make us regret much the great want of medical records in the darker part of the English history. For example: there is a fragment of an Act of Parliament preserved of the 8th of Henry the Second, (A.D. 1162) for regulating the stews in which it is ordained, among other things, that no stew-holder shall keep a woman who has the perilous infirmity of burning. See *Stow's Survey, v. 2. p. 7. and Howel's Londinopolis, p. 337.*

of linen and soap, the greater facility of procuring fuel, and the more ample supply of water. Body-linen was not in common use till the eighteenth century. Soap was not manufactured in London till the year 1554. What was used before that time was brought from abroad or from Bristol, where a coarse sort was manufactured*. There was no regular supply of coals† to London till the reign of Charles the First. It is almost needless to mention, how much an ample supply of fuel is conducive to health, not merely for warmth and for culinary purposes, but as promoting ventilation, which it does not only by the change of air necessarily induced by the current of air up the chimney, but by enabling the poor to admit fresh air in cold weather. It is in the winter season, from want of fuel, that typhus infection is most apt to arise, and to spread.

A plentiful supply of water promotes health in a great city, not only by its application to various household purposes, but by cleansing the gutters

* See Anderson's History of Commerce, and Howel's Letters.

† The prejudice entertained against pit-coal as an article of fuel pernicious to health, was at one period so strong, that a law passed, making it a capital offence to burn it within the city, and only permitting it to be used in forges in the vicinity. The late Mr. Astle, keeper of the records in the Tower, informed me, that he there discovered a document, importing, that a person had been tried, convicted, and executed for this offence in the reign of Edward the first.

and common sewers. The original supply of water was by conduits conducting it from the adjacent fields. The water-works at London-bridge were first erected by a German engineer in 1581, but the supply was scanty till the formation of the New River in the reign of James the First. Other sources of supply have since arisen, as the metropolis increased, and the powerful and ingenious machinery of the steam-engine has at length been applied for conveying and raising it to the tops of the highest houses in all situations, and for extinguishing fires, affording a degree of abundance and accommodation in this article of life hitherto unknown. The watering of the streets is also of importance to health*. The foreigners† who visited England in the sixteenth century, draw a most disgusting picture of the uncleanly habits of the inhabitants of London, and of the filth of its streets. In the reign of Charles the First there was considerable improvement; but it appears from cotemporary English writers, and still more from the accounts of foreigners‡, that heaps of

* Dr. G. Fordyce was of opinion that the dust of the streets of London was of serious detriment to health, by exciting pulmonic disorders. See *Transactions of a Society for the improvement of Medical and Chirurgical Knowledge, v.* 1, *p.* 252.

† Almost all our information on this subject is derived from foreigners; another proof that observation is suggested by comparison. See Erasmus's Epistles, Hentzell's Travels in England in the time of Q. Elizabeth, Davila's History of the Civil Wars of France, Book 3d.

‡ See Davenant's Works, page 351. London, 1673.

the most noisome filth were allowed to accumulate in the streets at assigned spots, called laystalls. It appears also, that the streets were then extremely narrow and ill paved, the buildings very crowded, and the sewers very imperfect.

It was not till after the Restoration, that those regulations and practices were introduced, which have led to the present salubrity of this city, and to those accommodations and elegancies which are peculiar to this age. It was not merely the rebuilding of that part of the metropolis which was consumed by fire in 1666, on a better plan, which effected the extinction of the plague and the diminution of some other infectious disorders. This was seconded by new and energetic measures, adopted by the legislature* as well as by the magistracy of London, for the removal of filth, the improvement of the common sewers, the widening and paving of streets. It was not till the next century that the cleansing of the streets was still

* See Statutes at Large, 19th of Charles II. chap. 3, sect. 20 and 22, and 23d of Charles II. chap. 17; also Acts of Common Council, copied into Hughson's History of London, vol. 1. pages 242 and 259. The thinning of the population since that time, must have had the most beneficial effects upon health. It is remarked, in the Parliamentary Report of the enumeration and Parish Registers of 1811, part 2, p. 199, that the population of the ancient city of London had diminished by more than three fifths in the course of the last century, though the total population of the metropolis had nearly doubled in that time. See more on this subject in the 3d vol. of these Transactions, p. 37.

further promoted, by its becoming a source of revenue, instead of being an article of expence; for the mud, and all manner of offensive and putrid substances, were found, (in consequence of the progress of agricultural skill and industry), to be very valuable to the cultivators of the land.

It is to the rapid increase of science and natural knowledge, which began in the latter part of the seventeenth century, that we are to ascribe not only this, but many other triumphs over the ignorance*, superstition, and barbarism of former ages; and it must be highly pleasing to every cultivated and well-disposed mind, to contemplate the useful and liberal lights of knowledge, and the energies of industry, advancing hand in hand, lending mutual

* The principal information on these subjects, in the beginning and middle of the seventeenth century, is derived from the writings of Howel and Davenant; and as a proof of the prevailing ignorance and superstition of that age, it may be remarked that the former, though one of the most eminent writers of that time, and Historiographer to the King, not only maintains an argument in favour of the existence of witchcraft, but mentions with approbation the numerous trials and executions of the wretched beings accused of that imaginary crime, in 1646. Might not these strange delusions have been properly enough enumerated with the leprosy and sweating sickness, in the list of diseases which have disappeared? Some of those who have been accused of witchcraft, believed themselves to be guilty of it, and might not they, as well as others who believed it, be stated, without a metaphor, as labouring under a species of epidemical insanity?—The passage in Virgil, so apposite to this point, will naturally occur to every classical reader: *Felix qui potuit*, &c.

assistance to each other, and conferring on mankind the most substantial and practical benefits, none of the least of which is the improvement of health.

The ~~only other~~ fourth general head of causes influencing health are the climate and the fluctuation of the seasons. There has probably been but little change in the temperature of the atmosphere of this island since the ages in which it was overgrown with wood *. But this is by no means certain, there being no records on this subject on which to found a comparison, till the invention of philosophical instruments in modern times. As it is in our power to gratify posterity on this subject, by affording them the means of comparison, it becomes us not to forego this claim to their gratitude.

There are five circumstances belonging to the seasons of this climate which affect health. 1st. It is found that, in a severe winter, a much greater number of aged people die, also of those who labour under chronic affections of the lungs, palsy,

* It appears from history that wood when generally diffused over a country has a very sensible effect in rendering the atmosphere colder than it would otherwise be. The air being a pellucid body is not warmed by the rays of the sun, except by the effects of refraction not worth estimating, but derives all its sensible heat from the surface of the earth, and it is evident how wood must intercept this operation of nature. See an article in the Phil. Trans. vol. lviii. p. 58. by the Hon. Daines Barrington; also Robertson's History of America, vol. i. note 30.

and dropsy, and of young children*. 2dly. There is a greater tendency to pulmonic inflammation in the spring months, in proportion to the prevalence of the north-east wind periodical at this season. 3dly. There is greater tendency to *cholera morbus* in the end of summer and beginning of autumn, and this in proportion to the heat of the preceding summer. 4thly. There is a greater tendency to bowel complaints in general during all the autumn months. 5thly. The strength of the wind has an influence on health. Wind is the great ventilator of nature, and its effects have, perhaps, not been sufficiently appreciated. It is mentioned in Maitland's History of London, that for several weeks before the plague broke out in London, in 1665, there was an uninterrupted calm, so that there was not sufficient motion in the air to turn a vane. Baynard, a cotemporary physician, confirms this fact; and the like circumstance is mentioned by Diemerbroeck†, in giving an account of the plague at Nimeguen. It is evident that calms must favour the concentration of human effluvia, particularly in a crouded and uncleanly population; and by the concurring testimony of all authors, it was always among the poor and squalid that the plague made its first appearance, and among whom it was most prevalent and fatal. It seems a well-established fact‡, that the

* See Heberden on the Influence of Cold, Phil. Trans. 1796.

† De Peste, L. 1. Cap. 6.

‡ This principle is well illustrated in Dr. Heberden's work on the Increase and Decrease of Diseases, page 94. See also Observations

same morbid effluvia which produces typhous fever, gives a susceptibility or predisposition to the attack of other febrile contagions: and after such diseases have been produced, it is evident how windy weather must retard, and calm weather favour, their propagation. As the plague existed more or less every year about that time, it is clear that the presence of infection alone is not sufficient to render it epidemic, and that some other cause or causes must concur. These, I conceive, chiefly to have been the accumulation of impure effluvia, favoured by calm weather, and concurring with a certain pitch of atmospheric temperature; for it never appeared as an epidemic but in one season of the year.

During the twenty years which form the period of these observations, the only remarkable deviations from the ordinary course of nature, with regard to the weather, were in 1795, 1799, and 1800. The months of January and February, 1795, were colder than for many years before, or any year since*, Dr. Heberden remarks, that the mortality of January, 1795, exceeded that of January,

servations on the Diseases of Seamen, *passim*, and the 3d. vol. of this work, page 3, where an instance occurred of dysentery proceeding from the want of cleanliness and care at Flushing.

* The mean height of the Thermometer for these two months in 1795 was 30° 5. The mean height for the same months of the preceding five years was 40° 6. and of the following five years 39°.

1796, by 1352*. The mortality of the whole year was 21,179, which is greater than that of any year since, except 1800; or for eighteen years before, except 1793, in which year there was a great increase of mortality from small-pox, and a considerable increase from fever. It appears from the Parliamentary returns, that there was considerable increase of mortality in 1795 all over England.

The summer of 1799† was uncommonly wet and cold, and that of 1800 uncommonly dry, no rain having fallen in London from the 4th of June to the 19th of August, except a very few partial showers. In both these years the crops failed greatly, so as to occasion distressful scarcity; but there was no increase of mortality in London imputable either to the weather or to the scarcity: for though the mortality of 1800 was considerably above the

* Phil. Trans. vol. lxxxvi.

† The mean height of the Thermometer this year was 47.9. The mean of five years immediately before and after this year was 50.6. which may be considered as somewhat under the general average of this climate for the year of the cold winter, 1795, of which the mean was 49.7. is included in this calculation. The mean temperature of the three summer months of this year, was to that of the same months for five years before and after it, as 57.3. to 59.6. All these calculations are taken from the register of Mr. Six's Thermometer (which indicates the highest or lowest point during the absence of the observer) without doors, in the Philosophical Transactions. The other Thermometer generally reports the means three or four tenths of a degree higher. See some interesting observations on this subject in the 5th vol. of Phil. Transactions of Edinburgh, p. 193, by Professor Playfair.

average, it is fully accounted for by the increased mortality occurring that year from small-pox. It appears, however, from the Parliamentary returns, that the increase of mortality all over England was so great, that it is difficult to account for it in any other way than from the scarcity, which was much more severely felt by the kingdom at large, and particularly by the rural population, than by the metropolis, where the wages of labour are so much higher. The reported mortality of the whole kingdom that year was 185,970, which is greater than any year in the century except 1795, in which it was 188,232. The average of the four intervening years was 169,575; so that the mortality of the year of the cold winter exceeded this medium by 18,657, and that of the year of scarcity exceeded it by 16,395. It is evident why the effect of scarcity should not be felt till the year 1800; for the pressure of the short crop of 1799 could only be felt for a short time towards the end of the same year. A fair comparison cannot be instituted with the following years; for the abstract of the parishes' registers in the reports delivered in 1801, comprehended 612 parishes fewer than that of 1811.

There is an observation deducible from these reports, which, though not strictly belonging to this subject, I cannot help stating as a curious and striking proof of the influence of moral causes on the physical condition of man. In the year 1800,

and 1801, the number of marriages was considerably diminished in the metropolis, and still more in the kingdom at large. The average of marriages for the five preceding years was 67,713; in 1800, they were 63,429; and in 1801, they were 63,840. The number last stated sets the matter in a still stronger light, when it is recollected that the calculation is formed from an amount including 612 additional parishes. This was evidently owing to the great discouragement to marriage that arose among the labouring order, from the difficulty of maintaining a family under the scarcity and high price of provisions. The number of baptisms is also considerably under average in these two years, and also in 1802, for an obvious reason. And the marriages in the two years after the scarcity were considerably above the average, for reasons equally obvious.

There has been no prevailing epidemic deserving of mention, exclusive of small-pox, during this period of twenty years, except a catarrh in the spring of the year 1803.

It appears upon the whole, that, except in the case of extraordinarily cold winters, of which only one has happened in the above-mentioned series of years, the fluctuations of the weather in this climate do not much affect health in this age: and this affords a further presumption, that those fluctuations, called by Sydenham constitutions, do

not, as he conceived, depend on any mysterious and inscrutable changes in external nature, but on the compound effect of the state of the weather, and the concentration of human effluvia which was more incident to that age than the present. This last was entirely overlooked by Sydenham, as well as by Mead and Huxham, who lived still later. They referred the whole to the state of the atmosphere, or to mineral exhalations.

What has hitherto been said relates to preventive medicine, and it has appeared that in this there is much reason to be satisfied with the efficiency of art. It becomes a question, whether curative medicine possesses equal powers. This will best appear from what is to follow.

St. Thomas's Hospital was originally an almshouse, attached to a convent of Friars; but was founded as an institution for the reception of sick and maimed by King Edward the Sixth, at the Reformation, and endowed, like the other Royal Hospitals, from the spoils of the Romish church. Its funds were greatly augmented by King William and Queen Mary, who are considered as its second founders, and by private subscriptions and benefactions, which began in the same reign, and have continued ever since. It is situated in Southwark, on a track of ground on the south bank of the Thames, which from Greenwich to Lambeth was originally swampy, and no doubt aguish; but the

parts which have been built upon have long lost that character*. The soil upon which this and the other ancient parts of the metropolis are built is artificial, consisting of the rubbish of ages, which being hard and dry materials, must be favourable to health. But the situation being flat, and in the midst of a pretty close population, the perflation is not so perfect, nor the external air so pure, as would be desirable in chusing a site for an hospital. There is accommodation for 433 patients. All the beds are generally full, except ten or twelve, which are reserved for sudden casualties. There were formerly near 500 beds; but about thirty years ago, when I was elected, febrile infection prevailed so much, that my two immediate predecessors, and one of the surgeons, beside several of the menial attendants, had died in the course of the preceding year of fever caught in the hospital, upon which the number of patients was reduced, and new methods of cleanliness and ventilation were adopted. All the wards have ever since been annually white-washed; the strictest attention has been paid to the cleanliness of bed and body clothes, washing, sweeping, and other means of removing all offensive matter.

Iron bedsteads had been adopted before this time, as less likely to contract and retain infection than those made of wood.

* See the first article of the 3d vol. of the Transactions of this Society.

The new methods of ventilation consisted in making apertures at the tops of the windows, for the more free admission of the air. This was done by constructing the upper sash so that it could be drawn down, and by a board playing on a hinge immediately under this aperture, which being generally set at an angle to the horizon of about 45 degrees, prevented the cold air from blowing on the patients.

The main principle of ventilation consists in admitting the fresh air somewhere near to the ceiling; and if an issue is provided for the foul air at the ceiling itself, by means of a trunk carried to a certain height in the open air, and fitted with what is called a cowl to traverse with the wind, the ventilation will be perfect; for the sick are thereby sheltered from direct streams of cold air, and the recent and vitiated exhalations from the living body having, by their warmth, a tendency to ascend, are effectually dissipated. In consequence of these precautions, no medical attendant has since been affected with the hospital fever; nor could I ascribe more than three or four deaths of nurses and patients to this cause during the whole time of my incumbency. It is further to be remarked, that besides the generation and retention of infectious matter from defective ventilation, recoveries in all classes of patients are retarded by impure air.

This is especially remarkable with regard to severe injuries, and the capital operations of surgery. It is a remark of Mr. Howard, in the account of his visitation of prisons and hospitals, that at the hospital at Leeds no case of compound fracture nor trepan survived, till the ventilation of the wards was improved.

The like remark may be made with regard to lying-in women and infants. If pure air is necessary to preserve the health of the most hale and robust, how much more must it be so, when the powers of nature are weak, or under severe trials? In short, without pure air, the purposes of such institutions would be entirely frustrated. The utmost professional skill, and the most appropriate means of relief, would be unavailing; and not only this essential end, but the secondary, though very important end of hospitals, as schools of experience and instruction, would also be defeated.

There are at this hospital nine wards for men, and six for women, besides two for men and one for women afflicted with the venereal disease.

The number of females who apply, and are admitted, is considerably smaller than that of the other sex. This seems to be owing to the former being less exposed to the exciting causes of sickness, such as cold, fatigue, and intoxication, and also from there being a less proportion of destitute

strangers of this sex, as a smaller number of them resort to the metropolis, whether by sea or land. This may be one reason why the majority of patients in dispensaries are females.

The portion of cubic space allowed to each person is from seven hundred to a thousand feet. As far as I can ascertain, from my observations on civil, naval, and military hospitals, six hundred cubic feet is the smallest portion of space that ought to be allotted to each person, in calculating the arrangements of an hospital. If it fall much below this, it will be found impossible, consistently with safety from cold, to maintain a due purity of the air.

There were about fifty persons admitted, and about as many discharged, every week. The number of medical and chirurgical patients admitted were nearly equal; but as a smaller number of the latter is discharged on account of the more protracted nature of the cases, the majority of patients actually in the hospital was chirurgical.

The admissions and discharges are made only one day in the week, with the exception of accidents, for which there is at all times ready admission, without petition or recommendation. This regulation is well adapted to the commodious administration of the hospital, and does not seem materially to interfere with the humane purposes

of the institution, except with regard to fevers. As the cases of this kind belong to the most indigent and squalid part of the population, it is clear that they are not only the most proper objects of relief individually, but with a view to the protection of the community, and they should be speedily admitted, in order to prevent the accumulation and diffusion of infection. Such cases are always most curable when taken early; and the utmost danger and distress may result to the individual, as well as his family and neighbours, by waiting for the return of the weekly day of admission. Acute cases also admit of more relief, and are a charge to the hospital for a shorter time than chronic affections. I have been told, that there are hospitals in which it is a rule not to admit fevers. It is difficult to conceive what idea the authors of such a regulation could form of an hospital as a beneficent institution, the end of which is the alleviation of human misery. Most probably the dread of introducing infection gave rise to it. If so, I beg most confidently to assure them, from very extensive experience in the public service, that fevers brought from the most infected situations become quite innocuous to those who approach them, provided care is taken, immediately on their admission, to cleanse their persons by stripping and washing them, and cutting off their hair, and provided the hospital is as well ventilated as St. Thomas's has been for many years.

With a view to remedy these defects in hospitals, and to extinguish febrile infection when prevailing in large towns, institutions, called houses of recovery, have been formed in London and other large cities, and they have been attended with the most beneficial effects, particularly in Chester, Liverpool, and Manchester.

The comparative mortality of different hospitals is a most fallacious test of the success of practice, unless the nature and intensity of the several diseases are taken into the account. A large mortality may even be considered as a presumption of an hospital being well conducted, in as far as it indicates that the most severe disorders had been admitted, or, in other words, that the most judicious selection of cases had been made. But, in one and the same hospital, and administered on the same principle, the same objection does not lie, and the comparative statement at different periods may be more fairly admitted in proof of the merits of its management. It is mentioned in some of the old chronicles, that the number entertained in the hospital at its foundation by Edward the Sixth, was two hundred and sixty*; but there is no account of the mortality till 1689, of which year the printed annual report has been preserved; and it appears that the number discharged in the pre-

* See Hughson's History of London, vol. iv. p. 464.

ceding twelve months was one thousand, six hundred and fifty-four; the number buried, two hundred and three; and the number remaining under cure was two hundred and forty-two. The mortality therefore was about one in ten. The next printed report extant is that of 1721; but the in-patients being blended with the out-patients, in the account of the admission and discharge, no judgment can be formed of the rate of mortality. The number under the head of deaths applies only to in-patients, and that was three hundred and forty. As the hospital had great addition made to its funds at the end of the preceding century and at the beginning of the next, and was about the same time rebuilt on a larger scale, the numbers became nearly double of what they were originally. The annual report of 1741 is preserved in manuscript, in which the in-patients and out-patients are stated separately, and it appears that the number of the former discharged was two thousand, four hundred and seventy-one; the number buried, two hundred and ninety-six; and the number remaining, four hundred and forty-six: this makes the proportion of deaths one in 10.9. The printed reports do not state the two classes of patients separately till 1764. There was no increase of mortality in 1740, the year of the great frost, though there was a very sensible increase of it in the community at large, as appears from the bills of mortality. The reason of this, no doubt, is that few

of the patients belonged to those classes who suffer from cold winters, that is, the very old, the very young, and the consumptive.

It has been remarked, that about the year 1783, some improvements were made with respect to cleanliness and ventilation. In order to judge whether this made any sensible difference in the mortality, I compared the average of the ten preceding years with the same number of subsequent years. I found the former to be in the proportion of one to fourteen, the latter of 1 to 15.6. The average rate of mortality for the next ten years was 1 to 14.2; but in the last ten years, that is, from 1803 till the present year, 1813, it has been 1 in 16.2. The average for the last fifty years, that is, from 1764, at which time the accounts of in-patients and out-patients were kept distinct, has been one in fifteen. The mortality among the medical patients was considerably above the general average, as might naturally be expected from the more fatal tendency of sickness than of injuries and local affections. The mortality of those under my cure was in the proportion of 1 to 9.8. In the tables of private practice the deaths are stated under each head; but no inference can be drawn from this with respect to the success of practice, except in the acute cases; for in chronic cases it very frequently happens, that a physician's attendance is broken off, before

the termination of the case, whether in recovery or in death.

As both these tables are intended to exhibit the different degrees of prevalence in different diseases in these times, it is necessary to state certain exceptions to this. Neither of these tables shew the fair proportion of small-pox, nor of the venereal disease, nor of lunacy, nor of childbed nor chirurgical cases. The first are excluded from the hospital, and in private practice only a small number fall under a physician's care; for the casual small-pox has for many years been almost unknown among the upper ranks of society, who chiefly employ physicians, and the inoculated small-pox is, for the most part, so slight as not to require the attendance of a physician.

The great majority of venereal cases falls under the care of surgeons, both in hospitals and in private practice.

With regard to lunacy, there are hospitals appointed exclusively for this malady, and private practitioners who devote themselves to the care of it, so that only a small proportion falls under the care of general practitioners.

The hospital tables convey no information with respect to the relative prevalence of children's complaints, nor of consumption, these classes for

obvious reasons not being admitted, except as out-patients.

I have placed small-pox in the list of those diseases which have been mitigated in this age. This effect cannot justly be ascribed to inoculation, for it has been * satisfactorily ascertained, that the partial benefit of it to those who undergo it has been overbalanced by its favouring the casual propagation of it. But it is fairly due to vaccination, for the benefit derivable from it, whether partial or general, is without abatement or alloy. Though the discovery of this was made in England, and though it is so highly interesting as a natural fact, and still more so by its influence on the destinies of the human species, yet it has made less progress here than, perhaps, in any other country. It was first practised about the year 1798, but it had no sensible effect in reducing the mortality of this city till 1803. In order to appreciate its effects, I shall state its mortality from the bills ten years immediately preceding its introduction, and compare this with that of the last ten years, ending at Christmas 1812. The total deaths by small-pox, according to the London bills of mortality, from 1788 till 1797, both years included, amounted to eighteen thousand, five hundred and thirty-eight; and the total of those from 1803 till 1812, both included, amounted to eleven thousand, five hundred and thirty-two, making a difference of seven

* See Evidence at large respecting Vaccine Inoculation, p. 32. London, 1805.

thousand and six, which may be considered as the number saved by vaccination. But when we reflect that there are countries which, by availing themselves to the utmost of this discovery, have entirely eradicated the small-pox, it is matter of regret that so many should have perished unnecessarily; and it affords such a humiliating example of the power of popular prejudice, as could hardly be expected in an enlightened age.

By comparing the number of the several diseases in the hospital list with those of the private list, it will be discovered which of them are most prevalent in the different ranks of society. Those which stand most prominent for this prevalence among the lower ranks are intermittent fevers, rheumatism, dropsy, and continued fever. One twentieth of the whole number on the hospital list were intermittent fevers, whereas * only one in one hundred and twenty-two belong to this head in the private list †. Rheumatism constitutes one fifth part of the hospital list, but only one twenty-sixth of the private list. One case in nineteen of all the hospital list is a dropsy, but only one in fifty-nine of the private list. The difference here, as well as in the last mentioned, is clearly trace-

* In making this calculation, I have subtracted about five hundred from the total amount of private cases; for consumptions and small-pox are excluded from the hospitals, and a number of the catarrhs, children's complaints, and other cases are such as would not have found admission as in-patients of the hospital.

† See the first article in the Third Volume of these Transactions.

able to the habits of life. It is evidently imputable to the greater propensity of the lower orders to intoxication, particularly from the use of ardent spirits. Neither dropsy of the breast nor of the brain enter into this calculation. Of continued fevers there are about one in eight of the whole number on the hospital list, and about one in eleven and a half in the private list. This may be easily accounted for from what has already been said of the usual origin of continued fevers.

The diseases which stand most prominent for their prevalence among the upper classes of society, are gout, disorders of the stomach, and liver complaints. With regard to gout, there is not a single case of it to be found on the hospital list, whereas there are in the private list a hundred and thirty, constituting about a twenty-sixth part of thewhole. No disease affords so strong a proof of the power of habits of life over health.

Disorders of the stomach constitute about a ninth part of the private list, but no more than a thirty-fifth part of the hospital cases. The reason of this is so obvious, and the fact itself so instructive as to need no comment.

The proportion of the diseases peculiar to the female sex in the hospital, is the same as in the private cases, from which it would appear, that the unfavourable influence of indolent habits, ex-

cessive delicacy and sensibility of mind and body in the upper ranks, compensates for the bad effects of hard labour and various privations in the lower orders, producing that equalization of human happiness and misery observable in other aspects of human life.

Of liver complaints, about one in forty-three belong to the private list, and one in a hundred and thirty-three to the hospital list. This is partly owing to the greater proportion of the better sort, who come from tropical climates, and partly from jaundice and gall-stones, being complaints of more frequent occurrence in sedentary and indolent than in active and laborious life. It appears from the tables, that there is a considerably greater proportion of apoplexies and palsies among the hospital than among the private cases: this is what we should not at first sight expect, for it is matter of the most ordinary and superficial observation, that a much greater proportion of persons who live at their ease, especially of the male sex, are attacked with hemiplegia, particularly where it proves suddenly fatal, than of the laborious part of the community. One cause of the great proportion of them among the poor may be, that exposure to cold and wet in their necessary occupations is a frequent occasional cause of it among them, as I found by questioning them at their admission. Another cause of this great proportion of them being found in the hospital may be that these cases are so severe, so sudden and helpless, that they

are all sent as speedily as possible to an hospital in the manner of accidents, and this is so true, that at St. Thomas's Hospital, an exception is made with regard to such cases, they are allowed to be considered as accidents, and are immediately admitted. Some cases of hemiplegia occur in full habits; some in spare and exhausted habits. The former being most incident to the luxurious and indolent, most frequently occur in private practice, and among the upper ranks of life. The latter occur more among the laborious classes, and among such of the rich as are addicted to exhausting pleasures *.

With regard to the two sexes, there appear to be certain diseases exclusive of those peculiar to each, which are more incident to the one than to the other. The proportion of the total females to the total males in the hospital tables, is not quite two thirds; allowance being made for this, it will appear by inspection, that there is a considerable majority of males under the heads of intermittent fever, pulmonary complaints, bowel complaints, rheumatism, hemiplegia, other palsies and dropsy. The only large head of disease in which there is a majority of females is cutaneous diseases. The cause of the great majority of intermittent fevers has been mentioned in the first article of the last Volume of these Transactions. The reader will readily trace the

* See Lecture of Muscular Motion, page 29, read before the Royal Society, 1788, by Sir Gilbert Blane, M.D. F.R.S.

causes of most of the other differences to the different constitutions and habits of life of the two sexes. With regard to the private cases, the number of each sex is not specified; but I find upon reviewing my notes, that they may be considered as equal. The diseases of which the great majority belong to the male sex, in the private list, are gout, pneumonia, asthma, rheumatism, palsy, especially that form of it called hemiplegia, the other species of palsy being nearly equal. There is a majority of male cases under dropsy, but much smaller than in the hospital list. I find the number of cutaneous cases equal in the two sexes, in my private notes, and am unable to assign any probable cause for the great proportion of such cases among the females at the hospital.

The practical application of these comparative views to the regulation of life, as conducive to health, is too obvious to require comment.

It is very desirable that such views should be made available to the purposes of curative, as well as prophylactic medicine. Let us try whether any useful deductions of this kind can be drawn with regard to the head of disease which stands foremost in the subjoined tables.

Continued fever may be considered as the principal source of mortality, and therefore the most important to be considered; and the first point to be

ascertained with regard to its treatment is to satisfy ourselves how far the powers of nature are equal to its cure.

The powers of restoration essentially inherent in the animal œconomy, are perceivable in most diseases, and in none more than in fever. This does not preclude the interposition of art as an auxiliary to the efforts of nature, which are frequently inadequate.

The only question is, how much is due to each? It appears obvious with regard to this and all other diseases; that unless we can calculate with some degree of precision the extent of the powers of nature, we shall find it impossible to assign what is due to these, and what to the agency of medicine in framing our experience with regard to the treatment of diseases; so that for want of such discrimination we may not be able to satisfy ourselves, whether recoveries have been effected by *virtue* of medicine, or in *spite* of it; and from such indefinite and equivocal views, we must frequently run the risk of congratulating ourselves on a great *cure*, where there may have only been a happy *escape*. With a view to resolve this important problem, it would be desirable sometimes to leave nature to her own struggles, as a standard for observation in comparing the result with that which occurs under the use of artificial means.

In the present circumstances of society, practitioners would hardly find it either prudent or warrantable to institute such experiments. Facts bearing on this subject, are most likely to be met with in the infancy of the art, before the discovery of the numerous artificial remedies with which we now find ourselves armed, and which we think ourselves bound to employ. Accordingly, there is to be found, in the very cradle of physic, some highly interesting and satisfactory information on this subject. In the first and third sections of the works of Hippocrates, there are forty-two cases of acute disease, in which the patients are particularised by name, and the symptoms, progress, and termination of their respective disorders, are related with the utmost clearness and the most exemplary candor. Of these, there were thirty-seven cases of continued fever without local affection. In the other five, there was inflammation on vital parts. Of the former, there died twenty-one; of the latter, four. Among the former, are included four cases of child-bed fever, all of whom died; and two, consequent on abortion, both of whom also died. Of the five cases of local inflammation, one was of the brain, one of the throat, one of the lungs, one of the bowels, and one of the liver. None of the subjects of these cases survived, except that of the lungs. The proportion of deaths therefore on the whole number, was twenty-five in forty-two. In continued fever without local affection, including

the cases of childbed and abortion, it was twenty-one in thirty-seven; exclusive of these, it was fifteen in thirty-one; and we have seen that, of local inflammations, four died out of five.

This statement is extremely instructive as well as curious; for it does not appear that any medical treatment was employed, except glysters and suppositories in a few, and blood-letting in one.

Little notice is taken of air or diet, and only one of the fatal events is imputed to mismanagement. This was the inflammation of the liver, in which it was alleged that the severity of the complaint was owing to the patient not confining himself in due time, and to his having eat animal food and drunk milk during his illness. The only active remedy mentioned in any of these cases, is that of letting blood at the arm in the pleurisy; and this is the only case of inflammation in a vital part which did not terminate fatally.

This record of remote antiquity, while it proves that near one half of those who are attacked with some of the most dangerous diseases incident to humanity may recover by the unassisted efforts of nature, furnishes us certainly, at the same time, with a powerful argument in favour of artificial means of relief; for the mortality far exceeds the proportion, not only in the annexed tables, but

in any other modern statement* with which I am acquainted, at least in temperate climates. It is even greater than the mortality at Jamaica in 1808, which is stated at 200 in 494. The rate of mortality, both in the hospital and private prac-

* There are two modern statements which seem at first sight to militate against this assertion. The first is in the 11th volume of the Medical Commentaries of Edinburgh for 1787, page 228, in which it is stated, that 89 persons were seized with fever in the Orphan Hospital of Edinburgh, all of whom recovered by no other means than an emetic in the beginning, and great attention to cleanliness and diet in the progress of this complaint. But of that number only four were adults; and on this it must be observed, that the febrile affections of children are less violent and more tractable than those of adults. One of the principal circumstances also to which the success was imputable, seems to have been the early attention paid to the patients in their first attack; for the danger is, in most cases, proportional to the neglect of early confinement, and of other immediate means of relief. This, however, is an instructive piece of information; for it may fairly be inferred from these cases, as well as those of Hippocrates, that medical means are not always requisite; that they are so, in various degrees, in various circumstances; that there are circumstances in which the powers of nature alone are sufficient, and in which the use of active remedies might not only be superfluous, but injurious.

The other statement is met with in the Edinburgh Annals of Medicine for 1803, page 293. The author endeavours to disprove the efficacy of medicine in interrupting the course of fever, and shortening its duration. This argument, however, does not seem to bear upon the question; for the point is, not what interrupts the course, or shortens the duration, but what mitigates the symptoms, and prevents a fatal termination of fever. If medicine performs this last, it effects all that is required of medicine. As far as my own observation goes, I should say, that unless the course of fever is interrupted in *limine*, (like the early extinction

tice, as exhibited in the annexed tables, is one in seven, and in several cotemporary statements, published by public institutions, it is still less.—There is no modern statement of private practice that I know of, by which a comparison may be instituted with the ancient, except what is here presented.

When I first formed the design of composing this article, it was my intention, in conformity to its title, to have given some practical details, but it has already been drawn out to too great a length. I trust, however, I have not laboured in vain in attempting to prove and elucidate my main position, that the comparative views exhibited by medical history are highly useful, and even indispensable, in eliciting truths applicable to the prevention and cure of diseases*. And I hope the

extinction of a fire which has caught a building) that is, in the first day, or the second at farthest, it will go through the stated process assigned by nature; but with very different degrees of severity and danger, according to the constitution of the patient and the treatment employed.

* For further information on the subject treated of in this article, the reader is referred to Dr. Heberden's two Tracts already quoted—an article by the late Dr. G. Fordyce, in the first volume of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, entitled, "An Attempt to improve the Evidence of Medicine;" a Tract by Dr. Woolcombe, of Plymouth, already quoted—a Work by Dr. Robert Willan, entitled, "Reports on the Diseases of London"—a Tract by Dr. C. Stanger, entitled, "Remarks on the Necessity and Means of suppressing Contagious Fever in the Metropolis, London, 1802"

 —a Work

same track will be pursued by others who possess more ample means and more adequate abilities, through the channel of a Society now becoming the principal centre for the collection, diffusion, and perpetuation of medical knowledge.

—a Work entitled, "A Collection of Papers, intended to promote an Institution for the Cure and Prevention of Infectious Fever, by John Clark, M. D. Newcastle, 1802."

ABSTRACT OF PATIENTS

Taken in and treated by me at St. Thomas's Hospital, from October, 1783, till April, 1794, with the exception of absences, amounting in all to six months; so that the whole time was ten years.

NAMES OF DISEASES.	ADMITTED.		DIED.	
	Men.	Women.	Men.	Women.
Continued Fevers -	288	205	37	32
* Intermittent Fevers -	159	33	7	0
Pulmonary Complaints	231	90	51	19
† Bowel Complaints -	189	75	29	9
‡ Rheumatism -	547	204	10	3
Inflammatory Sore Throat	15	6	2§	0
Scarlet Fever -	1	2	1	1
‖ Chronic Sore Throat -	5	4	1	0
Hemorrhoids -	6	11	0	1
Small-Pox -	18	11	10	2
¶ Erysipelas -	14	4	1	0
Stomach Complaints	70	40	8**	2
Carried forward	1543	685	157	69

* There were eighty-three tertians, sixty-six quotidian, thirty quartans, and thirteen not specified. The deaths were all from dropsy, consumption, and flux.—† Of these there were thirty cases of painter's cholic, none of whom died.—‡ Two of the deaths were occasioned by flux, one by phthisis pulmonalis, one by sudden grief, one by convulsions. There were very few of them acute cases.—§ One of the deaths was sudden, and could not be accounted for; the other was occasioned by phthisis pulmonalis.—‖ Some of these were probably cases of Cynanche Laryngea, with the nature of which I did not become acquainted till afterwards by meeting with them in my private practice.—¶ Many cases besides occurred in the hospital supervening on other complaints.—** One died of concussion of the brain, one of a mortification of the leg, two of pectoral complaints, one of a lientery attended with *aphthæ*.

NAMES OF DISEASES.	ADMITTED.		DIED.	
	Men.	Women.	Men.	Women.
Brought forward	1543	685	157	69
Vertigo, Chronic Head-Ache, and Gutta Serena	46	15	2*	0
Epilepsy -	16	17	0	0
Palpitation of the Heart	2	1	0	0
Insanity - -	2	4	0	0
† Locked Jaw -	8	1	4	0
St. Vitus's Dance -	7	1	0	0
‡ Spasms -	3	0	0	0
§ Tremors -	6	3	0	0
‖ Hemiplegia -	47	21	4	1
¶ Other Palsies -	48	19	1	0
** Palsy from Lead and other Metals -	7	0	0	0
Dropsy -	126	76	44††	33
Carried forward	1861	843	212	103

* One of the deaths was occasioned by a mortification in the hip, after erysipelas in the face; the other was that of a boy with a large head.—† Much benefit seemed to arise from opium, given in a cautious, gradual, and measured manner, also from the warm bath, and from anodyne and stimulant cataplasms. I have seen bad effects from opium, given hastily and to excess.—‡ One of these cases consisted in general spasms brought on by working in cold clay; another, in painful cramps without any ascertainable cause; the third proceeded from working in lead.—§ One of these cases was that of a man, in whom it was brought on by working in quicksilver.—‖ There were more seizures in the left side than in the right, in the proportion of about three to two.—¶ Some were universal, some confined to the upper, some to the lower extremities, some alternate.—** One of these was a worker in brass, five were workers in lead, one became affected by handling printers' types while they were hot.—†† One of the deaths was occasioned by the epigastric artery being punctured in tapping.

NAMES OF DISEASES.	ADMITTED.		DIED.	
	Men.	Women	Men.	Women.
Brought forward	1861	843	212	103
Jaundice -	9	6	2*	1
Inflammation of the Liver	11†	3	4‡	2
Scrophula -	35	10	2§	0
Cutaneous Complaints	84	93	2	1‖
Sea Scurvy -	4	0	0	0
Pemphigus -	1	0	0	0
Ophthalmia, Lippitudo and Leucoma -	15	5	1¶	0
Diabetes -	2	0	0	0
Other Urinary Complaints	39	15	3**	2
Venereal Complaints	137	65	1	2
Hydrophobia -	2	0	2	0
Hydrocephalus -	1	0	1	0
Tape Worm -	0	1	0	0
Diseases peculiar to Women††	0	256	0	18
Anomalous, obscure, and complicated cases	205	132	21	9
Total	2406	1429	251	138

* In one of these there was dropsy; in the other, a cancerous affection of the stomach attended with adhesions which obstructed the gall-ducts.—† Most of these were from the East Indies.—‡ In two of these, there were abscesses found in the liver: they were both from the East Indies.—§ One died of a continued fever; the other of a palsy.—‖ She died of a bad ulcer.—¶ This death was from continued fever.—** One of these deaths was from continued fever.—†† One of these was a case of menses from the navel.

ABSTRACT OF CASES

Occurring in private practice, from 1795 till 1806.

NAMES OF DISEASES.	Number of Cases.	Deaths.
Continued Fevers	267	38
Intermittent Fevers	25	1
Pulmonic Inflammation	145	25
Phthisis Pulmonalis	129	65
Spitting of Blood	36	3
Catarrh	271	0
Asthma	63	1
Hoarseness	9	0
Hooping Cough	31	5
* Palpitation of the Heart and Angina Pectoris	21	4
Aneurism of the Aorta	1	1
Rheumatism of the Thorax	3	0
Anomalous Cough	3	0
Abscess of the lungs from an old injury	1	1
+ Ossification of the Trachea	1	1
Peripneumonia Notha	10	1
Rupture of the Heart	1	1
Chronic Inflammation of the Larynx	1	1
† Sudden and severe pain of the Pectoral Muscle of one side.	1	0
Loss of Appetite, Acidity and Flatulence in the Stomach	118	0
Hypochondriasis	57	0
Acute Pain of the Stomach	92	0
Laborious Digestion	2	0
Vomiting of Blood	10	0
Vomiting and Nausea	43	1
Inflammation of the Stomach	6	2
Water Qualm *(Pyrosis)*	12	0
Cancer of the Stomach	3	3
Carried forward	1362	154

* In one of these cases there was an extreme distress of breathing for five years, and the pulse fluctuated from twenty to thirty-two, never falling below the former point nor exceeding the latter. Nothing gave material relief. Leave was not obtained to open the body after death.—One was cured by mercury, digitalis and arsenic.—† Cured by bleeding and antiphlogistic treatment. The blood was sizy.

+ See p. 470.

NAMES OF DISEASES.	Number of Cases.	Deaths.
Brought forward	1362	154
Inordinate Appetite	1	0
Dull Pain of the Stomach suspected to be Rheumatic	1	0
Inflammation of the Bowels	29	6
Dysentery	38	5
Cholera Morbus	67	4
Ileus	4	0
*Diarrhœa	101	5
Colic	12	0
Intestinal Hæmorrhage	30	0
Rles	27	0
Cœliac Passion	6	2
†Obstructed Mesentery	94	2
Flatulence of the Bowels	4	0
Constipation	9	0
Lientery	1	0
Ulceration of the Bowels	1	1
Fecal Congestion	2	0
Griping Pain and Diarrhœa after meals	1	0
Painter's Colic	2	0
Palsy of the Bowels	1	1
Acute Rheumatism	44	1
Chronic Rheumatism	75	1
Gout	130	7
Rheumatic Gout	5	0
Common Sore Throat *(Cynanche Tonsillaris)*	51	0
Quinsy *(Cynanche Pharyngea)*	11	0
Mumps *(Cynanche Parotidea)*	3	0
Bronchocele	2	0
Croup *(Cynanche Trachealis)*	3	0
‡ Cynanche Laryngea	3	2
Chronic Thrush	1	0
Angina pustulosa	1	0
Lumbago	2	0
Sciatica	3	0
Carried forward	2127	191

* A considerable number of these were children.—† These were chiefly children.—‡ This was an acute case, and ten years afterwards the same complaint returned in Ireland, and proved fatal; being the same individual whose case is related in this Volume by

NAMES OF DISEASES.	Number of Cases.	Deaths.
Brought forward	2127	191
* Chronic Headache	39	1
Vertigo	28	0
† Mania	24	2
‡ Epilepsy	16	2
Hemiplegia	36	19
Local Palsies	19	0
Paraplegia	4	0
Palsy from Lead	1	0
Catalepsy	2	0
Inflammation of the Brain	3	2
Lethargy	3	0
Tinnitus Aurium	5	0
Intolerance of Touch on the whole skin	1	0
Hemicrania	3	0
Neuralgia, or Tic Doulcureux	4	0
Gutta Serena	1	0
Tremors	3	0
§ Excessive Sensibility to Cold	2	0
Convulsions	8	2
Poisoned by Opium	1	1
¶ Chronic Suppuration of the Frontal Sinuses	1	0
Carried forward	2331	220

Dr. Perceval. I have since met with two chronic cases, both of which proved fatal, after a long series of suffering from threatening suffocation. They were both inspected after death, and *pus* was found in all the interstices of the muscles and bones of the larynx, the organization of which was considerably impaired.

* See the fatal case related in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, Vol. II. Art. 16.—† See one of the fatal cases related *ibid.*—‡ In one of the cases, which proved fatal, the epidermis of the feet and hands came off from time to time in form of a glove.—§ In one of these there was no other symptom of indisposition; in the other there was a rheumatic affection. The first was treated with chalybeates, opiates, and strong aromatics, under which he recovered. The other was treated with arsenic, and recovered under the use of it.—¶ The matter was discharged by the nose. After 15 years, there came on irregular hemiplegia and stupor.

NAMES OF DISEASES.	Number of Cases.	Deaths.
Brought forward	2331	220
Spasms	4	0
Raphania	1	0
Spasms of one side of the Neck	3	0
Small-Pox	15	3
Measles	32	3
Scarlet Fever	39	10
Chicken-Pox	2	0
Swine-Pox (Pemphigus)	1	0
Erysipelas	91	2
Cow-Pox	8	0
Inflammation of the Liver	15	1
Jaundice	25	2
Obstruction of the Liver	12	1
Gall-Stones	12	2
Redundant Secretion of Bile	5	0
Vitiated and Redundant Secretion of Bile	2	0
Swelled Spleen	1	0
Inflammation of the Kidneys	9	1
Stone and Gravel	48	1
+ Dysuria and Ischuria	20	0
Diabetes	5	1
Scanty Urine	1	0
Irritable Bladder	1	0
Ulceration of the Bladder	3	1
Incontinence of Urine	2	0
Bursting of the Urethra in Perinæo	2	0
Impotency	3	0
Emissio inconscia Seminis	2	0
Priapismus sine Libidine	1	0
Gonorrhœa Benigna	2	0
Excess of Venery	3	0
A peculiar species of Hectic Fever from Irritation of the Urethra*	3	3
Fluor Albus	46	0
Hysteria	97	0
Obstructed Menses	67	1
Profuse Menses	43	0
Carried forward	2957	252

* This was brought on by the repeated application of caustic, acting on infirm and irritable constitutions.

+ see p. 477.

NAMES OF DISEASES.	Number of Cases.	Deaths.
Brought forward	2957	252
Scanty Menses	23	0
Pale Menses	5	0
Uterine Hemorrhage	1	0
Painful Menstruation	5	0
* Flatus per Vaginam	1	0
Vomiting of Blood, vicarious to Menstruation	3	0
Irregular Periods of Menstruation	3	0
Extra Uterine Fœtus	1	0
Cancer of the Womb	7	4
Cancer of the Mamma	4	2
Child-bed Fever	1	1
† Chlorosis	23	0
Induration of the Os Uteri	3	0
Cancer of the Mouth	1	1
Venereal Disease	32	0
Ascites	23	11
Anasarca	28	0
Hydrothorax	37	14
Hydrocephalus	15	11
Dropsy of the Ovarium	2	0
Encysted Dropsy of the Groin	1	0
Impetiginous Affections	160	0
Carbuncle	3	1
‡ Shingles	5	0
Petechiæ sine Febre	2	0
Carried forward	3346	297

* A communication between the rectum and vagina had been produced by ulceration.—† One of these was a male of seventeen, who had all the characters of this disease except that which is peculiar to the female sex. He was treated like the others, and recovered under the use of carbonated iron and aloes. —‡ In one of these cases, the patient, after recovery, was for the remainder of her life, which extended only to a few years, almost incessantly tormented with a severe pain in the abdomen, in which nothing gave relief. On inspecting the body after death, it was found that immediately under the spot on the right side of the abdomen, which had been the seat of the shingles, and to which the subsequent pains had been referred, adhesions had taken

NAMES OF DISEASES.	Number of Cases.	Deaths.
Brought forward	3346	297
Pruritus Pudendi	2	0
* Sea-Scurvy	4	0
Nettle Rash	1	0
Scrophula	37	2
Rickets	4	0
Teething	2	0
Ophthalmia	15	0
Lippitudo	2	0
Excessive Secretion of Tears	1	0
Deficient Secretion of Tears *(Xerophthalmia)*	2	0
Tape Worm	3	0
Lumbrici	2	0
Ascarides	12	0
Old Age†	5	4
Anomalous, Obscure, and Complicated Cases	375	77
	3813	380

taken place, and no doubt remained that these pains had been occasioned by the mechanical dragging of these attachments.

* In none of these cases, except one, was the disease occasioned by a life at sea, but arose from some peculiar propensity of constitution, under ordinary diet and habits of life. They were all cured by lemon juice.—† The most common symptoms characterising the disease of mere old age were frequent rigors, frequent and long-continued jactitations, producing a state of considerable suffering and wearing out of the residue of life, by a sort of hectic fever. Their ages were from 80 to 99.

*** In constructing these Tables, the author has, perhaps, exposed himself to criticism, in point of technical nosology. If so, it has not been from want of a due sense of the utility of methodical precision, for he sets a high value on nosology, not only as it assists in discriminating and ascertaining the nature of diseases, but as it contributes to improve and enlarge those comparative views of them which it has been the principal end of this communication to recommend and apply. He has accordingly had regard to it in these Tables. But as they were originally drawn up for his own private satisfaction, and as he deems the *phænomena* of the human body in a state of disease to be the most anomalous branch of nature, he neglected the niceties of classification, and in offering them to the public, he feels more studious of that perspicuity and fidelity which may render them intelligible and available to the plain and practical reader, than to strain them into a conformity with system. —They were drawn up before the learned and luminous work of Dr. Young on Nosology was published.

ON

THE EFFECTS OF EVACUATING THE AQUEOUS HUMOR IN *INFLAMMATION OF THE EYES;* AND IN SOME DISEASES OF THE CORNEA.

By JAMES WARDROP, F.R.S. Ed.

Read May 11 *and* 25, 1813.

IN January, 1807, some cases of Ophthalmia were published in the Edinburgh Medical and Surgical Journal, in which the evacuation of the aqueous humor was attended with beneficial effects—but at that time, the practice was to be considered only in its infancy, the number of cases in which it had been tried were very limited, and I was unable to point out, with any degree of precision, the particular species of ophthalmia, and the peculiar symptoms of the disease which could be relieved by this mode of treatment. I had, however, sufficient experience to be convinced, that

the operation could be performed, in almost every case, without aggravating, if it did not arrest the progress of the inflammatory symptoms; and I therefore embraced that channel of laying my observations before the public, that both the application and the utility of the practice might be established by the additional experience of others.

The subsequent successful result of this mode of treatment in a series of cases of ophthalmia, and its utility in some affections of the cornea, have induced me to bring the subject before the public in this Memoir; being now enabled to point out, with some confidence, the particular species of the disease, and those symptoms, which the evacuation of the aqueous humor is best calculated to remove, and, at the same time, to recommend it as a mode of practice, from which very important advantages may be derived in some violent and alarming cases.

§ 1. *General Observations on the Evacuation of the Aqueous Humor.*

I formerly took notice*, that I was first led to evacuate the aqueous humor in some of the diseases of the eye from a very curious phænomenon observed by Dr. Barclay in that organ after death.

* Edin. Med. and Surg. Journal, vol. III. p. 56.

He remarked, that if the eye of an animal be moderately squeezed in the hand, the whole cornea will instantly become cloudy, and that when the pressure is increased, the obscurity also is increased. If it be still more squeezed, the cornea becomes of such an opake, milky colour, that the iris cannot be distinguished through it. He likewise observed the same appearances to be produced from filling the veins with water or quicksilver; but that, whenever the pressure or over-distending cause was removed, the cornea completely regained its transparency, and appeared as if no such experiment had been made *.

From this curious phænomenon in the dead eye, it was probable that, in the living one, the transparency of the cornea might vary according to the degree of its distension; and that, in some varieties of opacities of the cornea, the obscurity might arise from an increase in the quantity of the contents of the eyeball. Besides, therefore, bloodletting, purging, and the other means usually recommended in the treatment of the inflammation which generally accompanies obscurities of the cornea during the early periods of the disease, it occurred to me, that a more complete and sudden diminution in the contents of the eyeball might be produced by evacuating the aqueous humor.

* See the Muscular Motions of the Human Body, by John Barclay, M. D.

A favourable case for the trial of this practice soon occurred, where there was a very considerable degree of milkiness and opacity of the cornea, and in which also the eyeball appeared distended, prominent, and accompanied with acute inflammatory symptoms. I discharged the aqueous humor by a small incision through the cornea, and had the satisfaction to find that the operation produced not only an alteration in the degree of transparency of the cornea, but also that the pain, and all the inflammatory symptoms, were removed.

From the success of this case, I was not only convinced of the good effects which this operation might have in removing some opacities in the cornea, but, from the unlooked-for alleviation of the inflammatory symptoms, I was afterwards led to have recourse to this mode of treatment in violent cases of inflammation of the eyeball, in which the cornea had little or no share in the disease.

The evacuation of the aqueous humor in ophthalmia may appear to some, on first considering the subject, a violent and even formidable mode of practice, from the means necessary to accomplish it, consisting in a wound being made in an organ already highly inflamed, and become extremely irritable and painful. But the pain of making a puncture through the cornea is by no means acute, when the cornea itself is not in-

flamed, or otherwise diseased; and in the operation for the extraction of the cataract, where the cornea is quite sound, I have heard the patients compare the pain in making the incision through it, to a hair drawn across the eye. Though the cornea, in the natural state, has but little sensibility, yet it should be observed, that, if diseased, it becomes the seat of very considerable pain; and when it is inflamed, or when ulceration has taken place on any part of it, the pain of an incision becomes acute: besides, from the irritation which the exposure to light produces in an inflamed eye, and more or less pressure being always necessary to hold the eyeball steady, the evacuation of the aqueous humor cannot be accomplished, in many cases, without giving a considerable degree of uneasiness. The pain, however, produced by the operation, particularly if it be done with care and attention, soon subsides, and the good effects which quickly succeed, sufficiently compensate for any uneasiness it may have occasioned. Wounds, too, of the cornea heal with uncommon rapidity; and I have not, in a single instance where the operation has been performed, been able to detect the smallest vestige of an incision; nor has it ever occurred, so far as I know, that any visible cicatrix remained, even in those cases in which the operation had been performed when the cornea was in a previous state of ulceration.

In those cases where the practice of evacuating

the aqueous humor is judiciously had recourse to; although the operation may create some temporary irritation, yet its good effects will become immediately perceptible, and in most cases will be permanent. The more obvious of these are a more or less considerable improvement in vision, particularly in those cases where there is a cloudiness in the anterior chamber, a complete cessation of the sense of fullness of the eyeball, and pain in the head; and, in some cases, a very remarkable change in the size of the inflamed vessels.

The great and immediate relief which is obtained by the evacuation of the aqueous humor in ophthalmia, most probably arises chiefly from the sudden removal of *tension.* The pain accompanying inflammation in other organs of the body is, in general, in proportion to the degree of tension and resistance of the adjacent parts. It is well known how much relief is afforded in deep-seated inflammations, such as that of the periosteum, and in some varieties of whitloe, by making a free incision through the skin and external parts. The same thing is also illustrated in the good effects produced by dividing the gums during dentition, and in the relief generally afforded by the evacuation of the matter of an abscess. In the eye itself this observation is very strikingly applicable; for it often happens, in violent cases of ophthalmia, that suppuration takes place within the globe, and the purulent matter and humors are suddenly

discharged by the coats of the eye bursting. Whenever this takes place, it is invariably remarked, that all the inflammatory symptoms are suddenly alleviated.

There is a case mentioned by Prochaska *, where the aqueous humor was so acrid as to tarnish the cataract knife; yet this change does not appear ever to take place in ophthalmia. I have also heard of a case, where the point of a knife, which was broken off in the anterior chamber, was rapidly oxydated and absorbed.

In those cases where the discharge of the aqueous humor has been found beneficial, it is not even necessary to suppose that its natural quantity is increased. The inflammation will add both to the number and to the size of the blood-vessels within the eyeball, and consequently will increase the quantity of its contents; therefore, if the pain and any of the other symptoms arise, or are aggravated by that unnatural distension, the same good effects will result, whether the contents of the eyeball be lessened by a diminution in the number and size of the blood-vessels, or by the discharge of the aqueous humor. In many cases of ophthalmia, it is very probable that either of these means would have the effect of abating the

‡ Vide Voigtel Handbuch von der Pathologischin Anatomie, II Band. p. 110.

violence of the inflammatory symptoms; that in some cases the one shall be useful, whilst the other fails; and that, in very violent cases, both means may be employed at the same time with much advantage. It is not, therefore, to be understood, that the discharge of the aqueous humor is here to be recommended as the sole remedy in any case of ophthalmia, but is only to be considered as a powerful auxiliary in some cases, and in others as a sure, and perhaps the only means of preventing the total destruction of the organ.

When the object is to diminish suddenly the contents of the eyeball, the evacuation of the aqueous humor must fulfill this intention in a more complete manner than we can conceive probable to be effected by any means we have of abstracting blood from its vessels; for as the ophthalmic artery comes from the encephalon, little blood can be taken directly from any of its branches, and it would require a great quantity of blood to be drawn from the temples, or neighbouring arteries, to make any remarkable change in the quantity of the contents of the eyeball; or, at least, a change equal to that which would be produced by the discharge of the aqueous humor. From the advantages also which have been universally found to arise from a sudden depletion of blood, in comparison with what can be derived from a slow detraction, considerable benefit might be expected from the practice now

proposed; for as its effects must be immediate, a sudden change will be produced in the state of the organ, and a change favourable to the abatement of the inflammatory symptoms.

§ 2. *Of those Cases of Ophthalmia which are relieved by the Evacuation of the Aqueous Humor.*

From the number and variety in the phænomena which accompany inflammation of the eyes, from the combinations and various modifications of those phænomena, and from the fruitless attempts which have been made to describe the different species, of the disease, it becomes difficult to point out with precision, in this place, those particular forms of it, in which the propriety of discharging the aqueous humor is indicated. It would be foreign to the object of the present memoir to enter into any elaborate description of the different species of inflammation of the eyes, my intention being to attempt this in a future publication. It will now be sufficient to remark, in general, that those parts composing the organ of vision, in which there is a difference in the natural structure, present different phænomena when they become inflamed. Inflammation of the conjunctiva or mucous membrane of the eye is accompanied with that puriform discharge so characteristic of all inflamed mucous surfaces, as that of the urethra, vagina, bronchiæ, nose, and every other surface of a similar nature in the body. Inflammation of the differ-

ent structures which compose the cornea, inflammation of the iris, of the choroid coat, of the sclerotic coat, and of its investing cellular membrane, all present a variety of distinct and characteristic symptoms. Besides this difference, arising from a difference in the natural structure of the parts affected, there are distinct species of inflammation which derive their particular characters from being the effect of specific diseases. Of these we have examples in scrophula, cancer, lues venerea, rheumatism, and gout; all of which occasionally attack the eyes, in common with most other organs of the body. In all these species of ophthalmia particular examples do occur, in which the aqueous humor may be discharged with advantage; for though the inflammation almost always originates, and is most severe, in one of the textures of the organ; yet the whole eye is in many cases more or less affected, and thus symptoms arise which the evacuation of the aqueous humor is well calculated to remove.

I shall therefore, after describing the mode of performing the operation, enumerate those forms of ophthalmia in which the practice has been found beneficial, and illustrate these observations with the history of some cases. Before, however, entering into this detail, I may observe, in general, that there are no states of the eye in which this treatment is so applicable as in those cases where the coats threaten to give way; for, as was before

mentioned, many authors, who have described ophthalmia, have particularly noticed, that when the eye bursts, whether from internal suppuration, or from ulceration of the cornea, a remarkable alleviation takes place in the pain, and an abatement in all the other inflammatory symptoms. In the puriform, or, as it is often called, the Ægyptian ophthalmia, this is the usual termination of the severe cases of the disease, and is that change which, by producing a collapse of the globe of the eye, renders the organ irrecoverable.

But besides these, there are cases of a very different description,—in which the evacuation of the aqueous humor is of much advantage, and where the disease, though not of such a dangerous nature, is yet found unmanageable by the means usually employed.

The particular cases now alluded to, are those in which the cornea and anterior chamber acquire a peculiar kind of dimness, the transparency being restored, and the accompanying inflammatory symptoms alleviated, by the discharge of the aqueous humor.

Besides the peculiar muddiness in the anterior chamber, these cases are characterised by an uneasy feeling of distension in some part of the head, chiefly the forehead; and this symptom generally yields to the evacuation of the aqueous humor.

§ 3. *Of the Mode of discharging the Aqueous Humor.*

The aqueous humor may be discharged by a very simple operation, nothing more being necessary than to make an opening through the cornea of a sufficient size to allow that fluid to escape, and in such a situation that any subsequent cicatrix may not impair vision.

The opening may be made with any of the knives commonly used for extracting the cataract. It is sufficient that the point of the knife be introduced so that it makes a puncture into the anterior chamber; and this should be done near the junction of the cornea and sclerotic coat, at any part of the circumference. When the knife has penetrated the anterior chamber, it may then be withdrawn a little, and the blade turned on its axis, so that the aqueous humor will readily escape; and it is better not to remove the instrument altogether, till the fluid is observed to be discharged; for if the incision be not sufficiently large, and the knife taken away before the aqueous humor flows out, the elasticity of the cornea closes the wound, and either hinders the evacuation from being so sudden, and consequently so efficacious, or the closure of the wound entirely prevents its escape. The operation, therefore, which is necessary to discharge the aqueous humor, is merely the first step of the section of the cornea, made in extract-

ing the cataract, or what has been called *the punctuation of the cornea.*

The chief difficulty in performing the operation arises from the pain occasioned by the necessary pressure on the eyeball, whilst keeping open the eyelids; but until a sufficient portion of the cornea is brought into view, and the movements of the eyeball completely under the management of the operator, the introduction of the knife should not be attempted.

The upper eyelid should be kept open either by the fingers of an assistant, or by Pellier's speculum. If the latter be employed, it will be found useful to have the silver wire covered with a piece of crape, which will prevent it slipping from any moisture of the skin, an accident very common, and very troublesome. The operator, with the fore and middle fingers of one hand presses down the under eyelid, and applies their points over the tarsi, in such a manner that they touch the eyeball, and can apply any degree of pressure upon it which may be necessary. After the assistant raises the upper eyelid, the patient should be directed to look downwards; and the assistant then employs a sufficient pressure, to keep the eye in that position.

The operator may then make the puncture; but as the patient is very apt to start when he first finds

the instrument coming in contact with his eye, I have found it useful, merely to touch the cornea repeatedly with the back of the knife till all risk of starting is over; and as soon as the back of the extremity of the instrument rests on the part where the puncture is to be made, the knife can be raised very steadily on its point, and then the point thrust into the anterior chamber.

Though I have described the method by which the puncture of the cornea may be made with a common extracting knife, yet it is evident that the aqueous humor may be discharged equally well by other instruments, such as a couching-needle; and of late I have been in the habit of generally employing the instrument of Mr. Cheselden. The more we are in the habit of using any particular instrument, the more dexterity and ease do we acquire in its use.

§ 4. *Of the Evacuation of the Aqueous Humor in the Puriform Ophthalmia.*

There is no fact more striking in the history of the purulent ophthalmia, than the immediate and permanent relief which many of those unfortunate sufferers experienced, when the eyeball burst, and part of its contents was discharged. During the most excruciating pain of the eye and head, their agony was suddenly relieved when this accident

took place, which in some cases was even accompanied by a cracking noise. This is particularly taken notice of by those who have related the history of the disease, and it will be found a striking incident in all the accounts given by patients themselves, in whom the organization of the eye is found to be destroyed.

An artificial mode of diminishing the contents of the eyeball might, in such cases, be naturally expected, not only to produce the same alleviation of the violent symptoms of the disease, but by preventing the rupture of the cornea, and the subsequent protrusion of the iris, which takes place, would save the organ from that total destruction which is almost the inevitable consequence of the natural progress of the disease. The evacuation of the aqueous humor is well calculated to fulfill this purpose, and in a very considerable number of cases has been followed with the happiest effects. Mr. Ware, whose authority is so well entitled to our respect, first mentioned to me the probable good effects which the evacuation of the aqueous humor might be expected to produce, in those cases where the eyeball shews a tendency to burst, and in some remarks which he afterwards published on the purulent ophthalmia this practice is recommended, and two cases are given where it was successfully employed. The practice has also been adopted in this species of ophthalmia to a very considerable extent, by Mr. Mac-

gregor, surgeon to the York asylum*. "I have, within the last two years, (Mr. M. remarks) performed this operation in twenty-three instances, with a degree of success that strongly induces me to recommend it. For of this number, twenty-one were immediately relieved by it, and afterwards recovered their sight under the usual mode of treatment." And again Mr. M. observes, "It is to be regretted that this operation is not more frequently performed; for I am convinced that many persons have lost their sight from a rupture of the cornea taking place at that part opposite the pupil, which a timely and judicious performance of this operation might have prevented. As in the greater proportion of the cases which have come under my observation, the disease has been particularly mild, I have had no opportunity of reaping the benefits of this operation; for, among several hundred examples, there has not been one case where the cornea burst, or where suppuration took place within the eyeball: all the more severe symptoms being speedily removed by bleeding, purging, and a strict pursuance of the antiphlogistic regimen.

The more violent cases of this ophthalmia have appeared chiefly in the army, and it is therefore in our military hospitals, where we can expect to find most advantage from this practice.

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, vol. iii. p. 60.

In addition, therefore, to the other means commonly employed, more particularly bleeding and purging, the evacuation of the aqueous humor must be considered as a useful remedy in the puriform ophthalmia. Its introduction into those countries where the disease is particularly prevalent, and where it appears in the most severe and dangerous forms, would be attended with the most beneficial effects, and its judicious employment might be the means of saving the eyes of many of our soldiers who are abroad, more particularly those on the Mediterranean stations.

Little difficulty can occur in selecting the fit cases, and in determining the proper period for performing the operation. No states of the eye, during the progress of this disease, can arise as far as I know, which could render it improper, provided the accompanying symptoms are in any degree severe, and therefore the practice should be had recourse to, in all cases where the pain in the head and sense of distension in the eyeball are considerable. In those cases where the cornea threatens to burst, the operation becomes particularly urgent, and should be had recourse to without delay. The bursting of the cornea, in some cases, is preceded by an apparent change in the structure of that part of the eye; in other cases no previous alteration can be detected. The changes generally observed are, that the cornea becomes muddy in one part, or over the

whole surface; or its surface is studded with small white spots, which run into one another, as the inflammation advances to suppuration; and then ulceration of the cornea to a greater or less extent, always takes place. In other cases the cornea suddenly gives way, without any apparent previous change*. This has been particularly taken notice of by Dr. Veitch, and he remarks that in some cases of this ophthalmia, where he had an opportunity of examining the eye, both immediately before and after the aqueous humor was discharged, this fluid had escaped "by a division of the cornea, which was nearly as clean as if it had been cut with a knife." In the purulent ophthalmia of children, I have had repeated opportunities of making the same remark, and observing a straight division toward the centre of the cornea, the adjacent cornea being apparently sound.

§ 5. *Of the Evacuation of the Aqueous Humor in the Puriform Ophthalmia of Children.*

The history, symptoms, and consequences of the puriform ophthalmia in children, are so extremely similar to those of the puriform ophthalmia of the adult, that what has been said of the effects of evacuating the aqueous humor in the one, may be repeated regarding the other. When the inflam-

* Observations on Ophthalmia, by Charles Farrel, M.D.

mation arising in the conjunctiva advances to the other textures of the eye, and is not arrested in its progress, the eyeball often bursts by a rupture of the cornea. Now when there is any danger of apprehending such an accident, when an ulcer of the cornea is making rapid progress, or where the violence of the inflammatory symptoms indicate the danger of a rupture of the cornea, the aqueous humor may be evacuated, with the hope, not only of alleviating the severe symptoms of the disease, but of preventing that destruction of the cornea which is always followed by a change in the form of the eyeball, an obscurity of more or less of the cornea, a displacement of the iris, and a deformity or destruction of the pupil.

§ 6. *Of the Evacuation of the Aqueous Humor in the Gonorrheal Ophthalmia.*

Though we have no means of arresting the progress of some specific diseases, yet a great deal may be done to mitigate their symptoms. When the eye becomes affected with gonorrheal ophthalmia, the progress of the disease is generally so rapid, and the symptoms of it so severe, that the most powerful remedies are necessary to prevent its speedy destruction. Besides, therefore, the extensive depletive system, which should in such cases be adopted, it will be of great importance

to watch the progress of the disease in the anterior chamber, and when any symptoms do occur which indicate a rupture of the cornea, the aqueous humor should be evacuated without delay.

§ 7. *Of the Discharge of the Aqueous Humor, where the Capsule of that Humor is inflamed.*

On a former occasion* I attempted to show, that each of the three distinct textures which compose the cornea may be separately inflamed. There is no inflammation of the eye, where so much benefit is derived from evacuating the aqueous humor, as when that inflammation affects the internal layer of the cornea or membrane which contains the aqueous humor.

This disease is marked by a muddiness or turbidity of the anterior chamber which an ordinary observer would not readily ascribe either to an opacity of the cornea, or to a diminution in the transparency of the aqueous humor. Besides this diffused cloudiness there are generally one or more defined spots, which distinctly denote an opacity of the cornea. These do not resemble a common speck, but have a mottled appearance, and around the opake, white, central points there is a kind of disk, very like what we perceive in some agates, and

* Essays on the Morbid Anatomy of the Eye, p. 3.

what are commonly called the eyes of pebbles.—There is not much external redness accompanying the obscure anterior chamber—a blush of vessels only being seen around the sclerotic coat, at that place where the iris is attached to it; neither does the patient seem to suffer much pain from the effects of light, as he can generally open the eyelids and keep them so, and finds no benefit from a shade. The symptoms of this disease which are most distressing, are a sense of fullness and distension of the eyeball—as if it was filled with matter, and a dull agonizing pain, generally either in the brow or back part of the head; or in both these parts.

In this disease I have never found the evacuation of the aqueous humor fail in procuring an immediate relief of the pain of the head, and an instantaneous restoration of the transparency of the anterior chamber.

CASE I.

A woman, fifty years of age, had a general milkiness of the anterior chamber of the left eye, and a slightly opake spot nearly on the centre of the cornea. On the white of the eye there were a considerable number of distinct red vessels, none of which passed over the cornea. She could distinguish light with this eye, or a dark object placed

between her and the light; but neither form nor colours. Exposure to light gave her little uneasiness. —Had occasional epiphora, but particularly complained of a dull pain, extending through the head and eyeball.

The affection had lasted about a fortnight. After having had headach during the night, she found the eye red and painful when she awoke, and objects appeared as if seen through a mist. The symptoms had afterwards gradually increased.

Treatment.—I discharged the aqueous humor by a puncture through the cornea; and immediately after the operation she could perceive a finger with a ring on it, which was held before her eye.—She complained of a sensation as if a mote were in the eye, but she felt no acute pain. The cornea immediately regained its natural transparency, except at the speck, which became more distinctly circumscribed.

Some hours after the operation, the pain recurred with considerable violence, but it was relieved by the operation of a purge, fomenting the parts adjacent to the eyeball, and cupping the temples; and in a few days the eye was quite recovered.

CASE II.

In a youth fifteen years of age, the anterior chamber of the right eye had lost a good deal of its natural transparency, which appeared as if it proceeded partly from an obscurity of the cornea, and partly from a turbidity of the aqueous humor. There was a bright crimson redness over the whole albuginea; the vessels appeared deep, yet their ramifications were distinct. He complained of a sense of fullness in the eyeball, and of a dull, heavy pain in the orbit, eyebrow, and extending through the head. The pain of the eye was much increased by exposure to light. The inflammation had existed for three weeks, and had from its commencement been attended with the pain in the head.

Treatment.—The pain in the brow and head subsided immediately after the aqueous humor was discharged, and in the course of two days, the redness and obscurity of the anterior chamber went off.

CASE III.

There was a want of transparency in the anterior chamber of the right eye, which seemed, partly, to proceed from an opacity of the cornea,

and partly, from a turbidness of the anterior chamber.

A bright scarlet-coloured inflammation appeared over the whole albuginea, and the vessels seemed deep, but the ramifications were quite distinct. Exposure to light was very painful, and the patient complained of a sense of fullness in the eyeball, and of a heavy pain in the orbit, and brow, extending through the head. The inflammation had continued three weeks, and from its commencement had been attended with pain in the head.

Treatment.—The aqueous humor was discharged, and immediately afterwards, the pain in the brow and head completely subsided. The smarting from the operation continued only for a few minutes. He could open his eyes more freely. Redness increased, but of a darker shade, and the vessels more tortuous. No pain in the eye.

CASE IV.

A sailor boy, thirteen years of age, felt an itching sensation in his right eye, which, by constant rubbing, became red and painful. About eight weeks after, he was at sea during a storm of thunder and lightning, which increased the inflammation. The left eye also, at that time,

became affected. I saw him about ten weeks after the first attack. The anterior chamber of the left eye had become dull and cloudy; and there were three or more milk-white spots on the cornea, of the size of a pin's head, perfectly round, and distinctly circumscribed. The pupil was a little contracted; and there was only a very slight redness of the sclerotica, near to its union with the cornea. There was also a general cloudiness of the cornea of the right eye; and, on the inferior part of it, there was a speck of considerable size, with several red vessels ramified through it. There were also some small opake circular specks on different parts of the cornea. The blood-vessels were more numerous on the sclerotica of this eye than of the left. Exposure to light gave him acute pain in both eyes, and made them gush with tears. He had violent pain in both eyes, but particularly in the right; and he described the pain as having been extremely severe the day before, through his whole head. He also felt a sense of distension or weight over the eyebrow, and had a little general fever. A by-stander observed, that his eyes appeared too full.

I made an incision into the cornea of the left eye, and the aqueous humor spirted out forcibly. The operation occasioned smart pain for two or three minutes. A little blood afterwards appeared in the anterior chamber, which was effused in consequence of the division of the red vessels

which entered the edge of the cornea. The operation was afterwards performed on the right eye, and it caused more acute pain than in the left, for the incision was made through a cornea which was highly vascular, and had acquired a morbid degree of sensibility. In a few minutes, all the pain, which he conceived to arise from the cut, subsided; and the uneasy fullness and distension in both eyes were greatly diminished. He was ordered to use fomentations, and to take a purgative medicine. I saw him three days afterwards: he had no return of the pain of the eye or head since the operation: he could endure the light; and his vision was so perfect, that he walked two miles, and could distinguish readily, and without uneasiness, all objects around him. The opacities of the cornea of both eyes were greatly diminished; and there was very slight redness of the sclerotica.

CASE V.

A healthy-looking man, forty-five years of age, had inflammation in both eyes for six weeks, which began after the abatement of a violent pain of his head. There was a general cloudiness of the cornea of the left eye The iris could be distinguished but indistinctly. There were numerous vessels on the white of the eye; and they formed clusters

on different parts, giving it a mottled appearance. The eye looked unnaturally dry; and there was no intolerance of light. The disease in the right eye had the same appearance; but the cloudiness was limited to two-thirds of the cornea; and the red vessels were not so numerous as in the left eye. The vision of the left eye was almost entirely destroyed; and with the right one, every object appeared as if seen through a mist or smoke. Both eyes looked full and prominent. An eye-water, of corrosive sublimate, and the application of an ointment composed of the red oxyd of mercury, diminished, in a few days, the inflammation and opacity of the right eye. The obscurity of the left cornea, however, increased, so that the iris and pupil were very indistinctly seen through it.

Treatment.—I perforated the left cornea with a spear-pointed couching-needle, and immediately it appeared clearer to several by-standers. The operation was attended with no pain, neither was it followed by any inflammation. He afterwards used a wash of the nitrate of quicksilver, and the cornea soon regained its transparency. The pupil, however, remained a little irregular, with a slight dimness behind it; and objects appeared with this eye as if through a mist. By the external application of sulphuric æther, the dimness disappeared; and I saw him eight months afterwards, when he told me that he then saw as well as when he was a boy; for he had been short-sighted before his eyes became

inflamed; and probably the operation had diminished the natural convexity of the cornea.

§ 8. *Of the Evacuation of the Aqueous Humor in Abscess of the Anterior Chamber.*

In all cases where a puriform fluid is forming in the anterior chamber, the evacuation of the aqueous humor will be found highly useful; for, except in a very few remarkable instances, this never occurs where the inflammatory symptoms are mild. In most cases the deposition of a puriform fluid is attended with great pain in the eye and head, and a sense of fullness and tension of the eyeball. When these symptoms are not subdued by the common methods of treatment, ulceration of the cornea takes place, and the matter, along with the aqueous humor, is discharged, whilst more or less of the iris is protruded through the wound. The artificial discharge of the aqueous humor in the early stages of the disease, alleviates all the inflammatory symptoms, whilst the employment of the same means in the more advanced stages of the complaint, invariably prevents that rupture of the coats of the eye, which in general very much impairs, if it does not entirely destroy its organization.

In some cases the matter deposited in the anterior chamber, has a considerable degree of consist-

ence and tenacity, and will not be discharged by that puncture which is sufficient to evacuate the aqueous humor. When the matter is in small quantity, it is necessary to discharge only the aqueous humor, for, if the inflammatory symptoms be alleviated, the matter will afterwards be speedily absorbed; but in those cases where the quantity collected is considerable, and necessary to be evacuated, it is requisite to make an incision in the cornea nearly equal to that for the extraction of the crystalline lens.

CASE VI.

A man forty-five years of age, had a violent inflammation of the whole eyeball in consequence of a blow which he received on it three weeks before from a piece of coal, when mining. Nearly one half of the anterior chamber was filled with a puriform fluid. The central part of the cornea was opake, and ulceration was commenced on its surface, and he complained of violent pain both in the eye and head. A semicircular incision was made in the cornea, through which the aqueous humor along with the matter were evacuated. The pain ceased instantly. The wound of the cornea soon healed, no inflammatory symptoms returned, and the cornea regained its transparency by the application of stimulants, leaving only a small speck. It was evident, that in this case the cornea would have soon

given way where the ulceration had commenced; by which the organ would have been completely destroyed.

CASE VII.

A gentleman, about twenty-one years of age, had a very violent inflammation of the left eyeball. The sclerotica was covered with numerous scarlet-coloured blood-vessels; but none of them passed over the transparent cornea. The anterior chamber was turbid; and several small spots, of a matter resembling pus, were seen in it, towards its circumference. The pupil was much contracted, the eyelids swelled, and their external surface covered with varicose veins. There was a constant flow of acrid tears. Vision was almost entirely destroyed; but, notwithstanding, the eye was extremely sensible to light. He had great pain in the eyeball, and constant headach, with a sense of fullness in the orbit. The inflammation had begun five weeks before, without any known cause, and every symptom had, since that time, gradually increased.

Treatment.—I made a puncture with an extracting-knife through the cornea, and the aqueous humor spirted out. From the difficulty in securing the eyeball, the pressure employed gave consider-

able pain. The incision smarted for two or three minutes; but, before I left the room, he said he found great relief; and that the pain in the eyeball and head, and the peculiar feeling of weight and distension, were entirely removed. On examining the anterior chamber, all the turbidness had disappeared, and the cornea seemed perfectly transparent. He was advised to do nothing but foment the eye and the neighbouring parts, and to take a purge. As he lived at some distance from town, I had no opportunity of seeing him afterwards; but I was informed, that an hour after the operation, all the pain, occasioned by the incision and the pressure, was entirely gone, and the eye had become quite easy. In two days all the redness went off; and I was informed that the mark of the incision could not be discovered; that the inflammation had disappeared; and that his vision was nearly as perfect as it had been before the commencement of the disease. Some months afterwards, I heard that he continued perfectly well.

§ 9. *Of the Effects of discharging the Aqueous Humor in Staphyloma.*

The effects which are produced by discharging the aqueous humor in some cases of staphyloma, illustrate in a very satisfactory manner, the mode by which this operation seems to alleviate the symptoms of ophthalmia which have been already

noticed. For in many cases of this disease, whilst the staphylomatous tumor is increasing in bulk, the ball of the eye becomes inflamed, and the patient generally complains not only of a sensation of uneasiness and fullness in the eye itself, but of a pain more or less severe in the brow of the affected side, and under these circumstances the escape of the aqueous humor fails not to produce immediate relief, and none of the inflammatory symptoms recur until a regeneration of that fluid takes place.

The aqueous humor is often evacuated without the interference of art, the portion of the cornea which most easily gives way allowing an exit to that fluid. In several cases I have been able to observe this process frequently take place, so that ultimately a fistulous opening was established, which either remained always pervious, or which was occasionally closed by a thin, pellucid membrane which gave way, wherever a superabundant quantity of fluid was collected in the eyeball.

This natural progress of the disease points out a very easy method of affording relief when the pain and inflammatory symptoms are severe: under such circumstances, the aqueous humor may be evacuated by puncturing the tumor, an operation which cannot fail to alleviate all the symptoms in as complete a manner as would be fulfilled by that process which nature would ultimately have accomplished.

CASE VIII.

A gentleman who had a staphyloma of one eye for some years, produced, in consequence of a severe attack of inflammation, but which, till now, had given him little pain or uneasiness, was suddenly seized with pain in it, which soon spread to the brow and back part of the head; and became so agonizing, that in a few hours he was nearly distracted with its severity. He became extremely pale, and his pulse was very feeble.

Treatment.—I discharged the aqueous humor, from which he obtained instant relief; and in a few hours he was perfectly recovered. He was three or four times similarly attacked at the intervals of several weeks. The discharge of the aqueous humor was each time followed with instant and complete relief; and in order to prevent the recurrence of the symptoms, after puncturing the most prominent part of the cornea, I cut out a small circular portion of it. This opening was afterwards covered with a thin pellucid membrane, which readily gave way whenever there was a superabundance of the aqueous humor; and since the opening hath been made, he has remained free from pain.

CASE IX.

A woman received a sharp blow on her eye, which was considerably enlarged from a staphyloma. Two days afterwards the diseased eyeball was inflamed, extremely sensible to the touch, and she complained of a severe pain in the brow, extending through the head, accompanied by great prostration of strength, sickness, and fever. I punctured the staphyloma, and discharged a bloody fluid, after which she received much relief: the pain in the head disappeared, and the eye became easier. Four days afterwards the pain returned, but complete relief was obtained by again evacuating the contents of the staphyloma.

It is very probable, that in this case all the violent symptoms were produced from an effusion of blood within the eye-ball, in consequence of the injury.

§ 10. *Of the Effects of evacuating the Aqueous Humor in Prolapsus of the Iris.*

Even after the cornea has given way, and the aqueous humor has been evacuated, in severe cases of ophthalmia, the relief which that discharge produces does not remain permanent for the portion of the iris which is prolapsed, so completely fills up the wound, that no more aqueous humor can

escape, should its quantity become superabundant. Under such circumstances, an artificial discharge not only alleviates the inflammatory symptoms, but, if the protrusion of the iris has been recent, the depletion of the anterior chamber will permit the iris to fall back into its natural situation. In a case of this kind, where Mr. Ware performed the operation, immediately after the evacuation of the aqueous humor, the iris resumed its natural position. Should the iris still continue to be pressed forward, even after a puncture has been made on the cornea, recourse might then be advantageously had to the ingenious proposal of the late Mr. Gibson of Manchester. When the iris was prolapsed, either through a wound or ulcer of the cornea, Mr. G. found that the displacement arose from the portion of the aqueous humor lodged behind the iris, constantly pressing that membrane forwards at the point where there was least resistance. In such cases he made a puncture in the prolapsed portion of iris; and when the fluid collected behind it was discharged, it immediately regained its natural situation; unless in those cases, where, from the duration of the disease, the situation of the iris had become unalterable, from adhesions having formed between it and that portion of the cornea with which it was in contact.

§ 11. *Of the effects of evacuating the Aqueous Humor, in Injuries of the Eyeball.*

Injuries of the eyeball are very often followed by severe and tedious attacks of inflammation, more particularly punctured wounds, and wounds penetrating into any of the cavities.

Besides a powerful antiphlogistic treatment, much benefit will often be derived by discharging the aqueous humor, especially in those cases where, along with pain and redness of the eye, there is a sense of fullness and dull pain about the eyebrow, or some other part of the head;—symptoms of ophthalmia, which, it has already been remarked, the evacuation of the aqueous humor is particularly well calculated to remove. In all cases, too, where there is a tendency to the formation of matter after injuries of the eye, the discharge of the aqueous humor becomes a powerful auxiliary to the other means usually employed.

CASE X.

At the union of the cornea and sclerotica of the eye of a middle aged woman, towards the upper and nasal part, there was a prominent bluish-coloured tumor covered with a network of red vessels, and the iris was drawn towards that part,

so that the pupil was of an oblong form. There were a good number of red vessels over the sclerotic coat, and a dimness of the whole anterior chamber.

She complained of much pain in the eyeball, but particularly in the brow and temples. Her sight was impaired, and the pulse frequent and full. About eight days before, she had received a wound of the eye either from the spur or beak of a cock. All the symptoms were alleviated by the discharge of the aqueous humor, particularly the pain in the head, which was instantly removed; and the redness of the conjunctiva was much diminished. A slight heaviness about the eyebrow remained for a day or two, but went off by the use of brisk purgatives.

CASE XI.

While a strong healthy man was employed hammering melted iron, a piece of it fell into the eye, and was found lying between the eyeball and under eyelid. It occasioned most excruciating pain, and although it was removed in a few minutes, violent inflammation succeeded, and I saw him four days after the accident. The whole conjunctiva was then very much inflamed, and it was so much swelled, that the cornea appeared as if de-

pressed. There was a white slough towards the inferior part of the sclerotic coat, and on the corresponding portion of the internal palpebral membrane; but the cornea was not injured, nor its transparency diminished. He complained of great pain in the ball of the eye, extending over the forehead, and through the whole side of the head. He could not raise the upper eyelid without the assistance of his finger. Light gave considerable uneasiness, and his vision was so much destroyed, that he could only distinguish between light and darkness.

Treatment.—Under these circumstances I discharged the aqueous humor by making a small opening through the transparent cornea. The operation occasioned a smarting pain, which lasted a few seconds; when it went off, he said he could open the eyelid much easier; and was surprised to find that he could even distinguish the furniture of the room and books in a library. Slight scarifications were afterwards made on the under eyelid, which bled freely; and he was advised to foment the temples and adjacent parts; and as his pulse was frequent and full, he was bled at the arm, and ordered a brisk purge. During the remaining part of the day, the pain of the eyeball was much alleviated, and that of the head was completely removed, except that an uneasy sensation still remained in the brow. On the following day there was no vestige of the wound of the cornea; the

pain and swelling of the conjunctiva were nearly gone, but the redness continued. His vision was quite distinct, but the eye was irritable. In three days, by the application of an opiate, the inflammation was completely removed, his vision perfectly restored, and he returned home complaining merely of a little tenderness. Since which he has remained well.

A case of inflammation of the eye, occasioned by a burn, exactly similar to the case just related, though the symptoms were not so severe, was completely relieved by the evacuation of the aqueous humor, which suddenly mitigated the pain, and removed all the inflammatory symptoms.

§ 12. *Of the Changes produced in* Opacities *of the Cornea from the Discharge of the Aqueous Humor.*

It has already been observed that a diminution might take place in the transparency of the cornea, from an alteration in the quantity of the contents of the eyeball; and it has also been noticed, that in the dead eye the cornea assumes a milky colour when pressure is applied upon the eyeball, or when the veins are injected with pure water.

That some opacities of the cornea are produced

from an increase in the quantity of the contents of the eyeball, and not from the disposition of an albuminous fluid in the texture of the cornea, as takes place in common speck, seems to be proved from the immediate effects which have resulted, in some instances, from the discharge of the aqueous humor. In these cases the opacity of the cornea seemed entirely to arise from over-distension; for the instant the aqueous humor was discharged, the cornea regained its natural transparency, as imitated in the experiment on the dead eye. In other cases it was evident that the opacity of the cornea depended on two distinct causes; the one, as in the former cases, arising from over-distension, —whilst the other proceeded from that change in the structure of the cornea which produces common speck. Cases of the first class are distinguished by a cloudiness or turbid state of the whole anterior chamber; whereas in common speck the obscurity is more defined, being limited to a certain portion of the cornea.

These two different kinds of opacity were strikingly illustrated, in some instances where both took place in one eye at the same time, there being a general dimness throughout the whole anterior chamber, besides some defined spots in particular parts of the cornea. In these cases, the instant the aqueous humor was discharged, all the general obscurity disappeared, and nothing remained but the more opake spots, which became more distinctly circumscribed.

From what has been already said, little difficulty will arise in selecting those cases of opacity of the cornea, which the evacuation of the aqueous humor is calculated to remedy. From the cases, the particulars of which are detailed, the beneficial effects of the operation are sufficiently obvious, and would lead us to expect very important results from future experience.

CASE XII.

In a girl, twelve years of age, the whole of the white of the right eyeball had become of a bright red colour, from a number of blood-vessels, whose trunks could all be separately distinguished running in straight lines towards the cornea, and some of their small branches passed over its edge, and were distributed into its substance. There was a circular-shaped speck, of a considerable size, near the centre of the cornea; and throughout the rest of the cornea, particularly around the speck, there was a good deal of muddiness. The upper eyelid was slightly swelled, with some varicose veins on its external surface; whilst the vessels of the internal membrane were increased in number and in size. She had a good deal of pain in the eyeball, but it was particularly severe in the side of the head and temple above the affected eye. Though the vision was destroyed, yet she complained when

the eye was exposed to a bright light. The disease had continued three weeks. It began with the sensation of a mote in the eye, attended with pain; the following morning it was very red, and every symptom had increased daily.

Treatment.—The aqueous humor was discharged, which caused a good deal of smarting, but in a few minutes it subsided. A great change took place in the transparency of the cornea, all the general cloudiness instantly going away, and the speck left much more distinctly circumscribed. During the course of the day the pain of the head and eye went off, and she slept well during the night, whereas formerly her nights were very restless and disturbed by startings. On the day subsequent to the operation, she had not the least pain in the head or eye; the eye was not very sensible to light, and the number of blood-vessels was very much diminished. She could now readily distinguish all her fingers, and observe large objects at a considerable distance.

CASE XIII.

The eyeball of a woman, thirty-eight years of age, was very much inflamed, and some spots of a purulent looking fluid were seen in the anterior chamber, whilst, at the same time, there was a con-

siderable degree of opacity throughout the cornea. She complained of an intense pain of the eyeball, and in the forehead and temples. The disease was of three weeks standing.

Treatment.—The aqueous humor was discharged, the parts were afterwards fomented, and she took a brisk purge. On the following day the pain of the head was much easier, and the blood-vessels were less numerous.—She rapidly got well.

CASE XIV.

A lady, thirty-two years of age, had complained during eleven weeks of an inflammation in her right eye, attended with pain occasionally in the forehead, and inability to look at objects. There was a very opake speck of the cornea opposite the pupil, with a degree of turbidness around it, so that nearly the whole pupil was hid; the white of the eye was slightly red, and the eyelids were of a purple colour towards the edges; the eye watery. Scarifications, opiates, and stimulants, gave no relief.

Treatment.—The aqueous humor was discharged, and instantly the whole speck, except a small central portion, disappeared, and she could distinctly see with this eye immediately afterwards. All the inflammatory symptoms subsided in a few days by fomentations.

CASE XV.

The whole of the white of the eye of a healthy middle-aged man was crowded with vessels of a large size, and of a bright red colour: these vessels all terminated at the margin of the cornea, ran in a straight direction towards it, and did not ramify until they approached it, and there they divided into numerous branches. The transparency of the anterior chamber was diminished, and all objects appeared dim. The eyelids were a little swelled, and the blood-vessels on their internal surface, though not much increased in number, were enlarged and turgid. He had a violent pain in the forehead, which was not constant, but came on in such severe paroxysms that he could scarcely support their violence. The inflammation had come on four days before without any evident cause.

Treatment.—When the aqueous humor was discharged, the anterior chamber acquired its natural transparency, and he could more clearly distinguish objects. A remarkable change took place in the blood-vessels of the white of the eye; the number of them was so much diminished, and also their size, that the eye at once lost all the appearances of inflammation.

Besides ordering a purge, and applying fomenta-

tions to the eye, it was thought proper to bleed this patient, from the violence of the inflammation and its accompanying fever. Under that treatment he got well rapidly.

Two Cases of Ulcers in the Cornea, where the Aqueous Humor was advantageously discharged.

CASE XVI.

In a young lady the anterior chamber of one eye appeared very turbid, and there was an *ulcer* on the central part of the cornea, and a cluster of blood-vessels passing towards it; the whole eyeball was much inflamed, having the peculiar redness of the pustulous ophthalmia*. She complained of an agonizing pain in the forehead, which sometimes went off during the day, but was always severe in the night. The inflammation had lasted fifteen days, the pain in the head only eight days; little sleep, pulse quick, and the tongue white.

Treatment.—Discharged the aqueous humor by puncturing the cornea at the place where the vessels passed. The pain in the head never afterwards returned; and all the other symptoms rapidly subsided by the use of fomentations, and the vinous tincture of opium.

* See Essay on the Morbid Anatomy of the Eye.

CASE XVII.

A healthy looking young man had an ulcer of the cornea, accompanied with a good deal of inflammation and pain in the eyeball, in consequence of the suppuration of a pustule. The ulceration and inflammation subsided rapidly by the use of the vinous tincture of opium.

A few days after the eye had recovered this attack, he was suddenly seized with acute pain in it, which soon extended to the head. When I saw him, three days after its commencement, there was a distinct erosion, in two or three different places, with a good deal of muddiness of the cornea. There was also a bright redness on the white of the eye; he had intense pain in the head, accompanied with excessive languor and debility; his tongue white, and a quick hard pulse. The obscurity of the cornea instantly disappeared by the evacuation of the aqueous humor, and the pain of the head was alleviated. He was bled at the arm profusely, and the eye was fomented. On the following day all the symptoms were much relieved; and in a few days the ulcer healed, and the eye recovered perfectly, without the aid of any local applications.

CASE

OF

DISEASE IN THE BRAIN,

PRODUCED BY EXTERNAL VIOLENCE.

By ALEXANDER COPLAND HUTCHINSON, M.D.

SURGEON TO THE ROYAL NAVAL HOSPITAL AT DEAL.

Read March 2, 1813.

THERE are so few cases recorded of disease of the brain arising from external violence, and relating to a change of structure of that organ, or of its membranes, that I have been induced to draw up the following facts and observations for the Society.

Thomas Turnfield, a serjeant of marines, aged thirty-six, was admitted into this hospital from his majesty's ship Dictator, on the 14th of April 1810; labouring under occasional attacks of stupor, as stated in his case transmitted by the surgeon of the ship. He was about five feet nine inches in height, muscular, of a sanguineous temperament, and without any marks of a scrophulous habit.

Six years previous to this period, he was wounded on the left parietal bone by a cutlass, in boarding an enemy's vessel.—The wound, by report, healed readily without any exfoliation; leaving a cicatrix two inches in length, parallel to, and a little to the left of, the sagittal suture.

From the period of the infliction of the wound, he had complained of a constant headach, which, at the commencement, was more or less acute, but in time became gradually obtuse.

During the last seven or eight months, he had been subject to fits of stupor, which came upon him at very irregular intervals; sometimes once or twice a week, at other times only once a fortnight, until about the beginning of March 1810; when the paroxysms became much more frequent, seldom lasting longer than an hour or hour and half; and he had always sufficient warning of their approach to lay himself down. During the intermissions, he was perfectly sensible. His pulse, pupils, and countenance, were natural. His appetite was good, and the kidneys continued to perform their functions naturally. His bowels, for the last two or three months, had been so torpid, as to require the powers of the strongest cathartics to move them.

On the 15th April (the day after his admission), while I was in conversation with the patient, who

was dressed, and had been walking about in the ward, he suddenly became silent,—stepped a little aside, and quietly laid himself down upon his bed. In less than three minutes, his pupils were dilated to the utmost, and the iris of both eyes insensible to the stimulus of light. His pulse was slow and intermitting, not exceeding 52 strokes in the minute; his breathing laborious; and in half an hour he was foaming at the mouth.

This paroxysm lasted a full hour and half; but in less than another hour, he was walking about as before, free from every complaint, except slight languor, and his usual degree of headach.

The patient died in one of those paroxysms, on the 19th of April, being the fifth day after his admission, and the fourth attack he had experienced while in the hospital.

On the day of his admission, he had a brisk cathartic given him, and eighteen ounces of blood were abstracted from the jugular veins, both which were opened. On the following day, a seton was cut in the nape of the neck; his head was shaved, and directed to be frequently rubbed with a hard dry towel; and he was prescribed five grains of the Pilula Hydrargyri thrice a day.

Appearances on Dissection twelve hours after Death.

The scalp had its natural appearance, and the cicatrix of the cutlass wound did not seem to adhere to the subjacent bone; but moved over it with the other parts, though in a somewhat less degree.

On removing the scull-cap, the adhesions between the dura mater and bone were found stronger than usual; and the inner table of the scull, immediately under the cutlass wound, was free from any mark of disease.

Upon detaching the dura mater from the brain, a portion of completely formed bone was found deposited upon its inner side, of the size of a finger nail, and tolerably thick. It was attached to the left side of the longitudinal sinus, and corresponded nearly with the direction of the wound on the scalp. The veins traversing the left hemisphere were rather more distended with blood than on the right; otherwise the surface of the brain possessed its natural appearance.

On cutting into the substance of the brain, I found a tumor of a scrophulous nature, larger than a hen's egg; occupying a considerable portion of the middle lobe of the left hemisphere, and extending, in depth, to nearly on a line with the cor-

pus callosum. The tumor was not detached from the adjoining cerebrum, but seemed merely as a condensed, or, more properly, indurated portion of brain. There was no appearance of pus, and the ventricles contained about an ounce of serum.

The plexus choroides and optic nerves were natural, the former containing very little blood. The other parts of the brain and cerebellum were free from any mark of disease.

The thorax and abdomen, I lament to say, were not examined.

That the morbid appearances just described originated in the wound on the scalp, we have, I think, considerable reason to believe—first, from their situation being immediately under the wounded part; and secondly, from the constant headachs, with which the patient was afflicted, having commenced at the period when the wound was received.

Osseous deposits on the dura mater are not unfrequent; but it is worthy of remark, that this is the second instance I have met with, in which a deposition of bony matter, on the side of one of the great sinuses, has been accompanied by a tumor of the brain contiguous to it.*

* See the Case of the Gunner of the Fly, mentioned at p. 112, in the second volume of the Transactions of this Society.

With regard to the mode of treatment to be pursued in such cases of organic affections of the brain as that now described, I confess myself not very competent to give an opinion. A course of mercury, at an early period of the complaint, as recommended by Sir Gilbert Blane, appears to me, for the reasons stated by that experienced physician, to be likely to be serviceable *.

I cannot, however, here omit to urge the necessity of copious blood-letting, in the first instance, in all affections of the brain arising from external injury, concussion † not excepted; and in such cases, I do not know of any mode so good as that of puncturing the temporal artery. When it is found necessary to cut through the scalp, with the view to examine into the state of the bone underneath, I would also permit such vessels, as may have been divided in the operation, to bleed freely.

* See a history of some cases of disease of the brain, with an account of the appearances upon examination after death, &c. by Sir Gilbert Blane, M. D. F. R. S. in the Second Volume of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. See also a valuable paper in the first Volume of the Transactions of this Society, by Dr. Yelloly.

† In the extensive practice of some years at this public institution, I do not recollect a single instance, in which I had reason to lament the practical conclusion. It is necessary to remark, however, that as all the cases admitted into the hospital come from ships of war lying in the Downs, some few hours generally elapse before the patient can be conveyed on shore, and thus an opportunity is afforded, during the interval, for vascular reaction to succeed the sedative effects of concussion.

The propriety of this practice cannot, I think, be placed in a clearer point of view, than by briefly relating the particulars of a case of fractured cranium attended with considerable depression, that very recently came under my care.

Patrick Connelly, aged 23, was admitted into the hospital from his Majesty's ship York, on the 16th Sept. 1812, having fractured his scull that morning, by a fall from the main deck into the orlop.

He was taken up senseless, and continued so for two hours. When I saw him at the hospital, his senses were restored, he was perfectly coherent, and gave me a correct account of the accident; but he complained of irritability of the stomach, and much headach and giddiness. His pulse was slow, sharp, and slightly irregular; the vessels of his eyes were turgid, and I perceived a slight rotatory movement of the head, corresponding with the pulsations of the carotids.

The lacerated part of the scalp was about three inches above the left ear. I made a crucial incision upon it, and, by this means, discovered a fracture of four inches in length, on the parietal bone, running from before, backwards; and a depression of the inferior, or squamous part, about its middle, the whole thickness of the bone; but which gra-

dually rose to its proper level as it approached the extremities of the fracture.

That the depression was thus considerable, there can be no doubt, since, on placing the scalpel flat upon the depressed bone, in the presence of Messrs. Wooley and Mitchell, hospital-mates, the edge of the instrument passed with facility under the inner table of the upper or undepressed part of the cranium.

In the operation, a branch of the temporal artery was divided, which was permitted to bleed freely; and, as symptoms did not authorize us to do more, the divided scalp was brought together by slips of sticking plaster. The patient was prescribed a cathartic; and, late in the evening, twenty ounces of blood were abstracted.

Two small spiculæ of bone exfoliated, and in little more than a month the wound was cicatrised; but the violent attacks of headach and giddiness, with which the patient was affected during the greater part of this period, called for so frequent a recourse to the lancet, that on adding up, from his prescription ticket, the whole quantity of blood withdrawn at these different bleedings, within the first three weeks, I found it to amount to nearly two hundred ounces, without taking into the calculation the quantity procured by the repeated ap-

plication of leeches to the temples. He had also several blisters applied to the head; and latterly a seton was cut in the nape of the neck.

In order to promote the absorption of the asperities of the depressed bone, which was beaten down upon the brain, and to round its edge, that the compression might be as slight as possible, the patient was put on a gentle course of mercury, which was continued nearly three months, during the greater part of which time, his mouth was slightly affected; and on the 28th Jan. 1813, he was discharged to his duty, free from every affection of the brain, or other complaint.

The successful issue of this case, without having recourse to the application of the trephine, strikingly illustrates the justness of Mr. Abernethy's opinions, on that highly important subject *.

Royal Naval Hospital, Deal,
27th Feb. 1813.

* See Mr. Abernethy's Book on Injuries of the Head.

AN

APPENDIX

TO THE

FOREGOING PAPER.

By ALEX. C. HUTCHINSON, M.D.

SURGEON TO THE ROYAL NAVAL HOSPITAL AT DEAL.

SINCE I had the honour of submitting to the Society a paper on certain diseases of the brain, I have met with an instance of a peculiarity of structure in that organ, which has not, as far as I have been able to discover, been hitherto described *; and, as it bears a striking analogy to the subject of that paper, I beg leave to subjoin the following account of it, accompanied with a brief history of the previous circumstances, as detailed by Mr. Williamson, surgeon to his Majesty's ship Christian the 7th.

" Thomas Dawson, seaman, ætatis 28, of low stature, and of a full and healthy habit; while assisting to get up the top-gallant masts, on the 11th

* In the 3d vol. of the Memoirs of the Medical Society of London, page 54, Dr. Lettsom has given a long and very respectable list of authors whom he had consulted on affections of the head arising from various causes.

of March, 1813, the leading block gave way, and, his feet being entangled in the rope, he was tripped up, and his forehead struck with considerable violence on the deck. The part was contused and slightly discoloured, but the skin was scarcely abraded; he was a little stunned by the blow, but spoke sensibly soon after.

On examination, no fracture nor fissure could be discovered; his pulse was regular, and his eyes natural; he had no nausea, but bled freely from the nose, and complained of a severe pain over the fore part of the head. He was prescribed a cathartic, and compresses wetted with Saturnine lotion were kept constantly applied to the contused part.

In the afternoon, he had slight nausea with vomiting; the headach was the same; and as the cathartic had not operated, it was directed to be repeated.

Second day.—The symptoms continued nearly the same; the bowels not being sufficiently opened, the purgative was repeated. Towards evening, febrile symptoms began to shew themselves; the pulse was increased in fullness and frequency; the skin was hot, face flushed, and eyes irritable. He had some stupor, with a disposition to sleep; the bowels were open. He was bled to twenty ounces, which entirely removed the febrile heat, and, in some degree, relieved the headach. Ever since

the accident he had been unable to walk straight, and seemed to totter, not unlike a man intoxicated, the few times he tried that exercise.

Third day.—He said the pain was chiefly confined to the posterior part of the head; the bowels were open; there was no febrile affection, and his eyes were less irritable. A blister was applied to the nape of the neck, the pediluvium used, and he took camphorated saline draughts every four hours.

Fourth day.—There was no change, except that he rested rather better, throughout the last night, than he had done since the accident;—the camphorated saline draughts were directed to be continued.

Fifth day.—He had considerable febrile heat, with much irritability and restlessness, and some thirst; his face was flushed, pulse frequent and rather hard; respiration hurried and tongue white. He passed his urine unconsciously last night and this morning; pain now, he says, chiefly confined to the fore part of the head. He was bled again to 24 ounces, and, during this operation, the pulse kept its fulness. Immediately after the bleeding, he said his head was much relieved; the febrile heat, flushed face, and hurried respiration were certainly diminished, and he seemed more tranquil. The blood exhibited a dense buffy coat. Within a very few hours afterwards every symptom

increased,—his pulse became small and frequent, —his pupils dilated,—low muttering delirium and restlessness succeeded, and at half past twelve o'clock, on the sixth day, (the 16th of March) he expired without the least convulsive struggle.

It appears, by the concurring reports of his messmates, that he was always a healthy man, of a lively disposition, and not so much addicted to drunkenness as sailors generally are. It was stated that in the early part of his life, he was in the capacity of a groom, when, it appears, he had been thrown from a horse, and had fallen upon his head with some degree of violence; but that during two years' service in the Christian, he had never made any complaint. The immediate consequences of that accident could not be ascertained.

DISSECTION.

On the 17th March the body was received at the hospital for interment, when I embraced the opportunity of examining the state and appearances of the brain.

Upon inverting the scalp over the eyes and occiput, a slight degree of extravasation of blood was discovered a little above the superciliary ridge, where the blow had been received, but the bone was uninjured. The upper part of the skull being

forced off, and the dura mater exposed to view, its vessels were found unusually distended. Between the os occipitis and posterior lobe of the right hemisphere, resting on the dura mater, about half an ounce of coagulated blood was found; which, by its remoteness from the injured part, was owing, perhaps, to the rupture of a small vessel, preternaturally distended with blood, a short period previous to dissolution. On removing the dura mater, the vessels of the pia mater were also unusually turgid.

The right hemisphere, being divided on a level with the corpus callosum, and the ventricle exposed by another incision, six drachms of a colourless fluid escaped; and on examining this cavity, a portion of a small encysted tumor was found projecting into it at its anterior corner. The tumor was embedded in the corpus callosum, and a considerable part of it rested on the anterior crus of the fornix. It was of the size of a garden bean, felt smooth externally, and when pressed between the finger and thumb, communicated the sensation of its being filled with a cartilaginous substance.

Its connexions were traced to the falx cerebri, and internal carotid artery, by the side of the sella Turcica; and some very minute filaments of vessels were also traced in the direction of the ophthalmic artery, where it enters the foramen. There was neither the appearance of pus nor inflammation in

the vicinity of the tumor, and the surrounding brain exhibited no mark whatever of morbid affection.

The left ventricle contained nearly two drachms of a colourless fluid, similar to that found in the right; but every other part of the brain and cerebellum appeared to be wholly free from disease.

When the tumor was removed, and suspended by its numerous vessels, all of which entered together at one point, it exactly resembled a garden bean that had been planted a sufficient time for the radicle to have attained length to suspend it by, —the vessels entering where the radicle shoots.

The cyst was opake and very strong, and contained a smaller cyst, the size of a barleycorn, imbedded in a semi-medullary and adipose substance, studded with minute portions of bony matter. The small cyst was filled with a piece of bone of an irregular round shape, composed of layers, which the preparation clearly demonstrates from a portion of the outer layer having been broken off by the instrument in laying open the cyst.

That the tumor had existed a considerable period antecedent to the accident which was the immediate cause of the man's death, there is little doubt; and that the preternatural appearances ob-

served on dissection, independently of the tumor, were sufficient to account for his dissolution, appears to me equally certain.

This case, therefore, seems to evince, in addition to the evidence already existing upon this subject, that a morbid structure of the brain may exist for a long time, without much inconvenience to the patient, or the slightest interruption to the various animal functions; and, with other cases on record *, is, in my estimation, sufficient to authorize the conclusion, that a variety of chronic, and other affections of the head, are referable to blows or falls received in early life; when, probably, the accident that originally occasioned them had wholly escaped recollection. If I mistake not, a similar observation was made by a gentleman present at the reading of my former paper on this subject to the Society.

How long Dawson might have lived with the tumor on his brain, had the accident of which he died not occurred, is matter of mere speculation.

* See Dr. Lettsom's case in the Medical Memoirs before quoted; Sir Gilbert Blane's, in the 2d vol. of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge; and Serjeant Turnfield's case, related in this volume, page 188.

HISTORY OF

A CASE

OF

PREMATURE PUBERTY.

COMMUNICATED

By ASTLEY COOPER, Esq. F.R.S.

Read March 30, 1813.

CHARLOTTE Mawer, the daughter of a waterman at Lincoln, aged about four years and a half, had an appearance of the catamenia about a year and a half since, and again in the course of four or five months; but for the last two or three periods, nearly at the end of five weeks. The discharge exactly resembled that of most women, except that it was of rather a darker colour. The last period was about the fifth of this month, when the girl looked pale and seemed to have a degree of lassitude about her. The breasts are very full, and as large as most young women's of twenty years of age. She is very broad over her chest and loins. Her pelvis seems much larger than is ever observed at her age. The pubes is covered with a white-coloured hair, which began to shew itself when she had the first appearance of

the catamenia. She is quite a little woman in her appearance, except as to her countenance, which is childish. She is much bigger than a sister who is two years older. She plays with children of her own age, and does not seem to have any sexual feelings, or an uncommon degree of modesty. That there might be no mistake with respect to her age, the register of the parish where she was baptised was examined, which specified her being born on the 22d of March, 1806.

Lincoln, November, 1810.

Since the above account of the case of Charlotte Mawer was taken, she has continued to menstruate regularly; but there is now only a space of three weeks between each period. The discharge is as copious as in most women, and it generally continues about four days; it is the colour of venous blood, and does not coagulate. She is frequently affected with the leucorrhœa in the intervals; the hair has begun to grow in the axillæ; her countenance has not near so much the childish appearance; her voice is much rougher; she has a degree of modesty not formerly noticed, and does not now like to walk in the streets, because some boys have teazed her about her appearance. She is four feet and an inch high, is broader across the pelvis than the shoulders, measuring only fourteen inches and three quarters from one acromion sca-

pulæ to the other, but seventeen inches from the anterior superior spinous process of one ilium to that of the other.

Her eldest sister, aged about seventeen years, has never menstruated, and there is very little fullness in her breasts, though she is in good health. One of her sisters, aged ten years and five months, is four feet and two inches high, and is not so broad across her pelvis as her shoulders; she measures fourteen inches and a half from one acromion scapulæ to the other, and thirteen inches from the anterior superior spinous process of one ilium to that of the other.

August 3, 1812.

PATHOLOGICAL RESEARCHES

RESPECTING

THE DISEASES OF JOINTS.

By B. C. BRODIE, Esq. F.R.S.

ASSISTANT SURGEON TO ST. GEORGE'S HOSPITAL, AND LECTURER ON THE THEORY AND PRACTICE OF SURGERY.

COMMUNICATED

By Dr. ROGET.

Read April 13, 1813.

AS the articulations of the human body are composed of various parts, each possessing its own peculiar anatomical structure, we cannot but suppose that they are subject to a variety of diseases. It is also reasonable to conclude that these diseases may differ with respect to their causes and progress; that they may be attended with different degrees of danger to the affected organ, and that for each there may be certain remedies better adapted than others for its relief. Remarks so obvious cannot be regarded as original, yet I am not aware that any one has undertaken to investigate the subject with a view to make a classification of the morbid affections to which the joints are liable, and still less has it been attempted to point out the diagnostic marks by which they may

be distinguished, and the methods of treatment which they respectively require. The terms white swelling, scrophulous joints, carious joints, &c. have been employed almost indiscriminately, and I believe it will be found that the same name has often been applied to different maladies, and that the same malady has been spoken of under different appellations.

Yet no part of chirurgical science appears to be much more worthy of attention. The diseases of joints are of very frequent occurrence: some of them go on towards an unfavourable termination, in spite of whatever remedies are adopted; others are capable of being materially relieved or completely cured: they are all formidable if neglected. It is very desirable that we should be capable of forming such a distinction of these diseases, as may enable us to determine in what case a cure may, or may not be expected, and in the former, what applications or medicines may be employed in preference, and with the fairest prospect of advantage.

Perhaps nothing has contributed in so great a degree to the modern improvements in surgery, as the practice of examining the changes of anatomical structure which disease produces, particularly in those cases where there has been an opportunity of witnessing the previous progress and symptoms of the complaint. There seems to be no better foundation for a scientific arrangement of diseases, or

for acquiring a knowledge of the characters by which they are to be distinguished; and the having ascertained in what the deviations from the natural actions of the animal body consist, is at any rate an important step towards understanding the method, by which such deviations are to be corrected.

If a joint be examined in the most advanced stage of a disease, all the parts composing it are found blended into a confused mass, in which it is impossible to distinguish the original nature and seat of the morbid action. It is only where an opportunity presents itself of making the dissection at an earlier period, that we are likely to procure that kind of information which is calculated to throw light on this subject. But such opportunities are of comparatively rare occurrence, since the joints are not vital organs, and the affections to which they are liable seldom prove fatal, or even require amputation, until they have made considerable progress; and this circumstance is in itself sufficient to form a very material obstacle to the improvement of this branch of pathology.

It is only by the successive labours of many individuals, that any part of a science so difficult and so obscure as those of medicine and surgery can be brought to a state at all approaching perfection: but this, instead of operating in a contrary manner, should rather form an inducement to each person, who possesses the means of gaining experi-

ence, to lay the results of his experience before the public; to bring them into the common stock, and to contribute, as far as it is in his power, to the general improvement of his profession. The observations, which I have now the honor of presenting to the Society, are, for the most part, drawn from cases which have come under my notice within the last few years, in one of the principal hospitals of this metropolis. They relate to the pathological history, and classification of the diseases of joints. Should this communication be favourably received, I may, on a future occasion, venture to offer some additional remarks on the diagnostic symptoms by which these diseases may be distinguished, and the different methods of treatment which they require for their relief.

II.—*On the Inflammation of the Synovial Membrane.*

The soft parts which, added to the bones and cartilages, constitute the structure of the joints, are the synovial membrane, by which the lubricating fluid is secreted; the ligaments, by which the bones are connected to each other; and the fatty substance, which occupies what in certain positions would otherwise be empty spaces. It is to be supposed that the adipose membrane belonging to the joints may be inflamed; that it may be the seat of abscesses and tumors, as well as that which is situated beneath the skin, or in the inter-

stices of the muscles; and the ligaments cannot be regarded as more exempt from disease than the fibrous membranes, which they very nearly resemble in their texture. The ligaments and the fat of joints are sometimes inflamed in consequence of mechanical injury; and I cannot say that I have never seen a case where disease, independently of this cause, has originated in them; but I certainly have met with no instance where it has been proved to have done so by dissection, and it may be safely asserted, that this is a rare occurrence, and not what happens in the ordinary affections to which the joints are liable.

On the other hand, no part of the body is much more frequently diseased than the synovial membranes. This is what their anatomical structure and their functions might lead us to expect, since we generally find that living organs are more subject to have their natural actions deranged, in proportion as they are more vascular, and as they are employed in a greater degree in the process of secretion.

For a more particular account of the synovial membrane, I may refer to the authors who are quoted below*. At present it is sufficient to

* Bichat. Traité des Membranes. See also Dr. William Hunter's Paper on the Structure of Cartilage, in the 42d vol. of the Phil. Transactions.

observe that its office is to secrete the synovia, by which the motion of the joints is facilitated; that it lines the ligaments, by which the bones are held together; covers the bones themselves for a small extent, and thence passes over the cartilaginous surfaces and the interarticular fat. Where it adheres to the bones and soft parts, it very much resembles the peritonæum in its structure, and possesses considerable vascularity; but where it is reflected over the cartilages it is thin and readily torn, and contains no vessels capable of carrying red blood:—its existence however, even here, may be always distinctly demonstrated by a careful dissection. The synovial membrane of a joint forms a bag having no external opening; in this respect resembling the peritonæum, the pleura, or the pericardium, which it also resembles in its functions, and to which it bears some analogy in its diseases.

Cases occasionally occur, in which a joint is swollen from a preternatural quantity of fluid collected in its cavity, without pain or inflammation. This may be supposed to arise either from a diminished action of the absorbents, or an increased action of the secreting vessels. The disease may be compared to the dropsy of the peritonæum, or pleura, and it has not improperly been designated by the terms *hydrops articuli*.

It more frequently happens that there is swell-

ing from fluid in the joint, with inflammation and pain. Here we may presume that the disease consists in an inflammation of the synovial membrane, with a consequent increase of the secretion from its surface; and this is confirmed by the appearances observed in those cases, in which an opportunity occurs of examining the affected parts after death.

In many instances, while there is still pain and inflammation in the joint, the fluid in its cavity is felt indistinctly, as if a considerable mass of soft substance lay over it. Often, when the inflammation has subsided, and the fluid is no longer to be felt, the joint remains swollen and stiff, painful when bent or extended beyond a certain point, and liable to a return of inflammation from slight causes. The appearances observed in the following cases, in which there was an opportunity of examining the effects which the disease had produced, seem to throw light on this subject.

CASE I.

A middle-aged man was admitted into St. George's Hospital, in September, 1810, on account of a disease in one knee. The joint was swollen and painful, with slight stiffness: fluid was felt in its cavity. The swelling extended some way up the anterior part of the thigh, behind the lower

portion of the extensor muscles. It subsided under the use of blisters and liniments. Two months after his admission into the hospital, he was seized with a fever, apparently unconnected with the disease in the knee, of which he died.

On examining the affected joint, the synovial membrane was found much dilated, so that it extended up the anterior surface of the femur, behind the extensor muscles at least an inch and a half higher than usual. Throughout the whole of its internal surface, except where it covered the cartilages, the membrane was of a dark colour from inflammation; the vessels being as numerous, and as much distended with blood, as those of the tunica conjunctiva of the eye in a violent ophthalmia. At the upper and anterior part of the joint, a thin flake of coagulable lymph was effused from the inner surface of the synovial membrane, of the size of a half-crown-piece. There was no other appearance of disease, except that at the edge of one of the condyles of the femur, the cartilage adhered to the bone less firmly than usual.

CASE II.

A. B. a young man, in the spring of the year 1808, in consequence (as he supposed) of exposure to damp and cold, became affected with a pain-

ful swelling of one of his knees. Under the treatment employed by the practitioner whom he consulted, the pain and swelling, in good measure, but not entirely, subsided. Three months after the disease first took place, he was admitted into St. George's Hospital. At this time the knee was swollen, painful, and tender. The swelling had the form of the articulating ends of the bones. The leg was confined nearly to the straight position, and admitted of very little motion on the thigh. His general health was unaffected.

Blood was taken from the knee by cupping, and afterwards it was rubbed daily with mercurial ointment and camphor. Under this treatment the pain and inflammation subsided, and the swelling and stiffness were in some measure lessened. It afterwards became necessary to amputate the limb on account of another disease. The operation was performed on the 15th of December, 1808, and I did not neglect the opportunity of examining the joint.

The bones, cartilages, and ligaments were in a natural state. The synovial membrane was about $\frac{1}{8}$ of an inch in thickness, and of a gristly texture. It was closely attached to the surrounding cellular membrane and fascia by means of coagulable lymph, which had been formerly effused on its external surface.

These cases seem to explain the usual consequences of inflammation of the synovial membrane. It occasions, 1. a preternatural secretion of synovia. 2. effusion of coagulable lymph into the cavity of the joint. 3. in other cases, a thickening of the membrane, a conversion of it into a substance resembling gristle, and an effusion of coagulable lymph, and probably of serum into the cellular structure, by which it is connected to the external parts.

I have seen several cases, where, from the appearance of the joint, and the symptoms, there was every reason to believe that the inflammation had produced adhesions, more or less extensive, of the reflected folds of the membrane to each other; and I have observed, occasionally, adhesions in dissection which may reasonably be supposed to have arisen from inflammation at some former period.

These effects of inflammation of the synovial, very much resemble those of inflammation of the serous membranes. There are, however, some points of difference. In the former I have reason to believe, that suppuration rarely takes place independently of ulceration; but this is a frequent occurrence in the latter. Inflammation of the peritonæum, or pleura, though very slight in degree and of very short duration, terminates in the effusion of coagulable lymph; but it is only violent,

or long continued inflammation which has this termination in the membranes of joints.

The slight adhesion of the cartilage to the bone in one of the cases which have been related, we must suppose to have proceeded from the greater disease in the synovial membrane. I shall have occasion hereafter to remark, that the same thing may be observed where the cartilage is about to ulcerate. I have known a few cases, in which there was extensive destruction of the cartilages of a joint, and which, from the previous history and symptoms, there could be no doubt was occasioned by neglected inflammation of the synovial membrane. I believe, however, that this does not frequently occur, and that in most cases where the two diseases are combined, the ulceration of the cartilage is the primary affection, and the inflammation of the synovial membrane takes place subsequently in consequence of the formation of an abscess in the cavity of the joint.

The inflammation of the synovial membrane is sometimes acute, but more frequently it assumes the chronic form, and then it is very often confounded with other more serious maladies under the general appellation of white swelling. Perhaps nearly one half of the cases to which this term is applied are of this description. The disease takes place from various causes, but in most instances from the application of cold, which ex-

plains why it is more liable to occur in the superficial joints, such as the knee and ankle, than in the hip and shoulder, which are defended by a thick mass of soft substance from the influence of the external temperature. The disease may also arise from the use of mercury exhibited in too large quantities, or in particular constitutions; from rheumatism, and a generally debilitated state of the system. In these cases the inflammation is to be considered as a symptom of a constitutional complaint; often affecting several joints at the same time; leaving one joint to attack another, and it is for the most part less severe, and less disposed to terminate in the effusion of coagulable lymph and thickening of the membrane, than where it is entirely a local disease.

III.—*On Ulceration of the Synovial Membrane.*

When an abscess has formed in a joint, an ulcerated opening takes place in the synovial membrane, through which the matter is discharged. The following are the only cases, which have come under my observation, where ulceration of the synovial membrane has occurred as a primary affection. The most remarkable circumstance, which they demonstrate, is, that a disease, apparently slight, and of a part which is in no way concerned in the vital functions, should produce such a degree of dis-

turbance of the constitution as to occasion death. Of this however, they form by no means a solitary example, and every surgeon and physiologist will be able to call to mind numerous other instances which shew that an impression upon a small part of the nervous system may derange, and ultimately destroy, the functions of the whole animal machine.

CASE III.

A young lady nine years of age, being at play, on the 1st of January 1808, fell and wrenched her hip. She experienced so little uneasiness that she walked out, on that day, as usual. In the evening she went to a dance; but while there, was seized with a rigor, was carried home, and put to bed. Next morning she was much indisposed, and complained of pain in the thigh and knee. On the following day she had pain in the hip, and was very feverish. These symptoms continued; she became delirious, and she died just a week from the time of the accident.

On inspecting the body, on the following day, the viscera of the thorax and abdomen were found in a perfectly healthy state. The hip joint, on the side of the injury, contained about half an ounce of dark-coloured pus; and the synovial membrane, where it was reflected

over the neck of the femur, was destroyed by ulceration for about the extent of a shilling.

CASE IV.

A middle-aged man who had, a short time before, met with a contusion of the shoulder, was admitted into St. George's Hospital in the winter of 1812. He complained of pain and tenderness in the shoulder, and a very slight degree of swelling was observable, but his principal disease was a fever resembling typhus in its character, of which he died in a few days after his admission.

On inspecting the body, about half an ounce of thin pus was found in the shoulder-joint. The synovial membrane bore marks of general inflammation, and in one spot, where it was reflected over the neck of the os brachii, it was destroyed by ulceration for about the extent of a sixpence.

IV.—*On cases in which the synovial membrane has undergone a morbid change of structure.*

There are some diseases which consist simply in a morbid action; there are others in which the morbid action produces a morbid change of anatomical structure. Diseases, of the latter class,

differ in their nature in different organs. Thus the tubercles which affect the lungs in phthisis pulmonalis are never met with in the breast; and cancer, which is frequent in the breast, never attacks the lungs except by extending to them from the contiguous parts. The disease, which I am about to describe in the present section, consists in a morbid alteration of structure which takes place in the synovial membranes of joints, and which, as far as I have seen, is peculiar to these parts. I have never known an instance of the same disease in the serous membranes, which so nearly resemble the former in their nature and functions, nor even in the synovial membranes that constitute the bursæ mucosæ and sheaths of the tendons.

Some years since, in examining a diseased elbow, I found the cartilaginous surfaces completely destroyed by ulceration: an abscess had formed in the joint, and no remains were observable of the natural structure of the soft parts, these being everywhere converted into a pulpy substance, of a light brown colour, and about $\frac{1}{3}$ of an inch in thickness. As the ravages of the disease were very extensive, it was impossible to determine from the appearances on dissection, where the morbid action had originated. This case, however, differed materially from some others which I had met with, in which the destruction of the cartilages was not attended by any affection of the soft parts similar to that which has been described. The following

cases, which have since occurred, furnish examples of the same disease in earlier stages of its progress, and shew that it begins in the synovial membrane, and that the other parts become affected only in a secondary manner.

CASE V.

In a diseased knee, which was sent to me for examination by my friend Mr. Horn, Surgeon to the Newcastle Infirmary, I found, in the cavity of the joint, about four ounces of a pale yellow fluid, having flakes of coagulable lymph floating in it. The synovial membrane, where it formed the loose folds extending from one bone to the other; where it was reflected over the bones themselves, the crucial ligaments, and the fatty substance of the joint, had completely lost its natural appearance. It was converted into a pulpy substance, in most parts about $\frac{1}{4}$, but in some parts, nearly $\frac{1}{2}$ of an inch in thickness, of a light brown colour, intersected by white membranous lines, and with red spots formed by small vessels injected with their own blood. The synovial membrane on the edge of the cartilaginous surfaces had undergone a similar change of structure, but only for a small extent. The semi-lunar cartilages were entire, but in a great measure concealed by the pulpy substance projecting over them. The cartilages

covering the bones, in a few places, were in a state of incipient ulceration.

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*CASE VI.**

Martha Manners, 26 years of age, was admitted into St. George's Hospital on the 6th of March, 1813, on account of a disease in her right knee.

She said that in June, 1811, she first observed the joint to be swollen and stiff; and from this time the swelling and stiffness increased; but in the first instance by very slow degrees. About Michaelmas, 1812, she caught cold, and the swelling increased more rapidly, but it was not attended with any considerable quantity of pain.

At the time of her admission into the hospital, the right knee measured about two inches in circumference more than the left. The swelling was elastic; prominent at the upper and lower part of the joint, not having the form of the articulating ends of the bones. The joint admitted of motion, but the leg could not be completely bent or extended on the thigh.

* This case has been inserted since the paper was read in the place of another of the same kind; but with the history and symptoms of which I was unacquainted.

Various remedies were employed without the smallest benefit. The stiffness of the joint increased. About the middle of May, she began to experience considerable pain, and soon afterwards an abscess presented itself by the side of the ligament of the patella, which was opened on the 15th of June. The orifice made by the lancet healed in a few days; but she continued to suffer severe pain; her health became much affected, and on the 6th of August the limb was removed by amputation.

On examining the joint, about an ounce of thick matter was found in its cavity. The ligaments were in a natural state. The synovial membrane had undergone precisely the same alteration as in the case which has been just related. The only point of difference that could be observed, was, that the *whole* of that portion of the membrane, which is reflected over the cartilages, had become affected, presenting the same appearance as elsewhere, but being thickened in a less degree. The cartilages had begun to ulcerate in a few spots; but the ulceration had made so little progress that it might not have been noticed on a superficial inspection.

CASE VII.

Samuel Langford, 24 years of age, was admitted into St. George's Hospital on the 22nd of April, 1812.

At the time of his admission one of his knees was swollen to nearly twice its natural size. The swelling was prominent on the anterior and lower part of the thigh. It was soft and elastic, so that at first it appeared to contain fluid, but on particular examination, the absence of fluid was ascertained, by the want of fluctuation. The leg was kept in the half bent state, and the joint admitted of only a very limited degree of motion. He had no pain even when attempts were made to move the limb. The skin, over the diseased part, was of a pale colour, with some dilated veins ramifying in it. On each side of the joint, a small orifice was observed, through which the probe might be introduced into a sinus; but the sinuses appeared to be of small extent. His general health was unimpaired.

He said, that two years ago he first experienced some pain in the knee, but it was not sufficient to prevent his going about his usual occupations. Soon afterwards the joint began to swell, and the enlargement gradually increased from that period. Several abscesses had formed at different times, but the greater number of them had healed.

About two months after his admission into the hospital, the limb was amputated.

On dissecting the diseased joint, the ligaments were found in a perfectly natural state. The

whole synovial membrane, except where it was reflected over the cartilages, was converted into a pulpy, elastic substance, of a brown colour, intersected by white membranous lines, in some places half an inch in thickness, in others more; and in those parts where the membrane was reflected over the bones, near the borders of the cartilages, it was destroyed, in spots, by ulceration.

The semi-lunar cartilages were in a natural state, but in a great measure concealed in consequence of their being enveloped in the mass of substance formed by the diseased synovial membrane.

The cartilaginous surfaces of the femur and patella were extensively, but not entirely, destroyed by ulceration; the ulceration being greatest towards the circumference. On the internal portion of the head of the tibia the cartilage was destroyed only for a very small extent, the ulceration being entirely confined to the margin. On the external portion of the head of the tibia the cartilage was absorbed to a greater extent. The bones possessed their natural structure and hardness. The cavity of the joint contained matter, and the sinuses communicated with it.

CASE VIII.

Michael Purcel, 16 years of age, was admitted

into St. George's Hospital on the 10th of July, 1811, on account of a disease in the right knee.

He said, that in the summer of 1807, he had received a blow on the inside of the joint. Some time afterwards a swelling formed and burst, and some fluid was discharged. In about a week the orifice healed; a slight degree of stiffness only remained, and he was able to follow his usual occupations. He continued well till December 1810, when the joint was observed to be increased in size. From this time the swelling increased, but with no other inconvenience than stiffness of the joint, and a slight degree of pain in walking.

At the time of his admission into the hospital, there was a large swelling of the knee, extending an inch or more up the anterior part of the thigh, under the extensor muscles. The swelling was more prominent in some parts, than in others: it was soft and elastic, and gave to the hand an indistinct sensation, as if it contained fluid. The leg was kept in the half-bent position, and was nearly immoveable on the thigh. He had no pain except on motion or pressure.

On the 28th of November, an abscess burst on the outside of the joint, and discharged a small quantity of pus. After this, other abscesses formed, and burst at various times. The swelling continued to increase.

Amputation was performed on the 6th of April.

On dissecting the amputated joint, all the ligaments were found in a natural state. The synovial membrane had precisely the same appearance as in the last case. In some parts it was half an inch, in other parts more than an inch, in thickness. The cartilages were for the most part destroyed by ulceration, and * carious surfaces of bone were exposed. The abscesses appeared to have formed in the substance of the synovial membrane, and did not communicate with the cavity of the joint, nor did the joint contain pus.

CASE IX.

A boy, 6 years of age, was admitted into St. George's Hospital, in March, 1808, on account of a disease in one knee.

The joint was larger than the natural size. The leg was bent at a right angle to the thigh, and admitted of no motion. The skin on the outside was ulcerated to a considerable extent. Various

* In using the term caries, on this and on other occasions, I have considered it as synonymous with ulceration; or, at least, as expressing that state in bones, which corresponds to ulceration in soft parts. Some confusion has been produced in Pathological Nomenclature, in consequence of this term having been employed by some, to express, not only bone, which is ulcerated, but that whose surface is exposed from other causes.

remedies having been employed without success, the limb was amputated on the 29th of April.

On examining the joint, the synovial membrane was found to have undergone a morbid change of structure, similar to that in the preceding cases, but with this difference; that the pulpy substance into which it was converted, projected into the joint, so as nearly to fill its cavity, and adhered to the cartilaginous surfaces. On making a longitudinal section of the joint, the cartilage covering the bones was seen, as a white line about $\frac{1}{10}$ of an inch in thickness, connected to the bone on one side, and having the pulpy substance adhering to it on the other. It was, therefore, thinner than natural; but otherwise entire, except at the posterior part of one of the condyles of the femur, where it was destroyed by ulceration for a small extent. There were no distinct remains of the ligaments external to the joint, and only some small remains of the crucial ligaments and semilunar cartilages.

The preceding cases furnish examples of the same disease, in different stages of its progress. The morbid action evidently originates in the synovial membrane, which loses its natural organization, and becomes converted into a thick, pulpy substance, of a light brown colour, intersected by white membranous lines. As the disease advances, it involves all the parts of which the joint is com-

posed, producing ulceration of the cartilages, caries of the bones, wasting of the ligaments, and abscesses in different places.

I have already remarked, that this disease is peculiar to the synovial membranes, at least that I have never met with it in any other part of the body; but it belongs to the same order with the tubercles of the lungs, the schirrus of the breast, the medullary sarcoma of the testicle, and numerous others, in which the natural structure of the affected organ is destroyed, and a new and different structure is added in its place. To these also it bears a near resemblance in its progress. Thus tubercles of the lungs, in the first instance, occupy the vesicular and interlobular substance; but, ultimately, they inflame and ulcerate; abscesses form in them, and then the pleura, the bronchia, and the other contiguous parts become affected. Similar circumstances mark the progress of other maladies of the same description.

In many other cases, in which, however, I had no opportunity of examining the morbid appearances, the similarity of the history and symptoms, and the resemblance in the form and elasticity of the tumor, has indicated the disease to have been of the same nature as in those which have been related. The complaint uniformly has proved slow in its progress, and sometimes has remained nearly in an indolent state for many months, or

even for one or two years; but I have never met with an instance, in which a real amendment was produced; much less have I known any, in which a cure was effected. Indeed there seems to be no analogy that should lead us to expect so favourable a termination, as I am not aware, that a part that has once completely lost its natural structure, is capable, in any instance, of having that structure restored. The progress of this disease in a joint may be retarded by rest, by the occasional application of leeches, and the removal of those causes which are calculated to excite inflammation; but I have never known more than this to be done either by internal medicines or local remedies. When the cartilages are in a state of ulceration, and abscesses have formed in and about the joint, and the patient's health begins to suffer, it is needless to recommend any other treatment than the removal of the limb by amputation, and to delay this for any considerable time can be attended with no benefit, and may produce much evil to the patient.

It is a remarkable circumstance that this affection of the synovial membrane is rarely met with, except in the knee. I have never known an instance of it in the hip or shoulder. It is probable that the influence of the external cold may operate as one of the causes, by which the disease is produced, and this explains why it occurs fre-

quently in the knee, and seldom in the deep seated articulations *.

It is evident from the history of cases in which a part of the living body assumes a new and morbid structure, that this alteration seldom takes place except by slow degrees: and it would add much to the interest and utility of researches in morbid anatomy, if it were more frequently attempted to ascertain what is the first change in the organization of the affected part which disease produces, and from thence to trace the gradual progress of the changes which take place, until the destruction of the natural organization is completed. Whether the following case is to be considered as of the same kind with those already recorded in this section, but in an earlier stage of the disease, cannot at present be determined; but it appears not improbable that it is so; and I shall venture to relate it in this place, in the expectation that it may, at any rate, be of some service in assisting the investigations of future enquirers.

* The account of the fungus articuli which has been given by some German writers, appears to have been drawn, partly from cases of the disease described in this section, partly from cases of inflammation of the synovial membrane. Mr. Russel seems to have taken his history of the pathology of white swelling from cases similar to those which have been related; but we must observe that the term, white swelling, has been applied, almost indiscriminately, to all the affections, to which the joints are liable, and by no means confined to that under our present consideration.

CASE X.

——— Belton, a boy 11 years of age, was admitted into St. George's Hospital in August, 1810, on account of a disease in one knee.

There was but little pain in the joint; it was slightly enlarged, admitted of some motion, but not of complete flexion and extension. His parents said that the disease had begun about a year and a half before his admission into the Hospital, that it had increased very slowly, and that he had never suffered from it any serious distress. Various remedies were employed without benefit, and in a short time his friends took him out of the hospital. A few weeks afterwards he died, in consequence of an accumulation of water in the ventricles of the brain.

I obtained permission to examine the body.

The synovial membrane of the affected knee, externally had its natural appearance. Internally it was lined by a straw-coloured gelatinous substance, so intimately adhering to it, that it could not be detached, except by an artificial separation. The synovial membrane was encrusted in this manner everywhere except on the cartilaginous surfaces. The gelatinous substance in general appeared about $\frac{1}{8}$ of an inch in thickness, but in

some parts near the borders of the cartilage, it was much thicker so as to project considerably into the cavity of the joint. In a few places towards the margin of the articulating surfaces, the cartilage had begun to ulcerate; in some of these it was entirely absorbed, so that the bone was exposed, but for the most part there was only an irregular ulcerated surface towards the cavity of the joint, the remaining portion of the cartilage being entire, and having its natural adhesion to the bone.

The synovial membrane itself bore no marks of inflammation. In the substance with which it was lined, some vessels were observed ramifying, beautifully injected with their own blood; but these were few in number and only in certain parts. This substance differed in appearance from the coagulable lymph, which is found on the surface of an inflamed membrane, and we may presume, therefore, that the effusion of it was the result, not of inflammation, but of some other morbid action.

§ 5. *On the Ulceration of the Cartilages of Joints.*

The cartilages of joints differ in some essential circumstances from those which are employed in other organs. The latter are more vascular, more liable to become inflamed; and inflammation in them usually terminates in the deposition of osseous matter. The articular cartilages in the adult

possess no vessels capable of carrying red blood. Inflammation is not in them a frequent occurrence; when it does take place, it terminates in ulceration, and not in the formation of bone.

Ulceration of cartilage may be the consequence of inflammation of the cartilage itself, or of the bony surface to which it is connected; but in many instances there are no evident marks of inflammatory action having preceded it, either in one part or the other, and the inflammation which afterwards takes place appears to be rather the attendant on, than the cause of, the ulcerative process.

The ulceration of soft parts is usually, and as far as I know, always attended with the secretion of pus; but it is otherwise with the articular cartilages, in which suppuration seldom takes place, while the ulcer is small, and often the disease proceeds so far, as to cause caries of the bones to a considerable extent without matter being formed in the joint. This circumstance is deserving of notice. It has been long established that suppuration may take place without ulceration; and it appears, that in this instance, ulceration may take place without the formation of pus.

In the cases, which have been related, the ulceration of the cartilages of the diseased joints was a secondary affection, the consequence of a mor-

bid action originating in the neighbouring soft parts. There are other cases, and those not of rare occurrence, in which the ulceration of the articular cartilages exists as a primary disease.

When the ulceration of the cartilage occurs in the superficial joints, it constitutes one of the diseases, which have been known by the name of white swelling. From cases, which I have met with, I am led to conclude, that when it takes place in the hip, it is this disease, which has been variously designated by writers, the "*Morbus Coxarius*," the "Disease of the Hip," the "Scrophulous Hip," the "Scrophulous Caries of the Hip-joint." At least it is to this disease that these names have been principally applied, though probably, other morbid affections have been occasionally confounded with it.

CASE XI.

In examining a body, brought into the dissecting room in Windmill Street, I found the cartilage in a diseased state in the joints of both hips, of one of the knees, and of both elbows. In some spots, the cartilages of these joints were altogether destroyed by ulceration, and carious surfaces of bone were exposed; in others the cartilage was

not completely absorbed, but it had the appearance of fibres, which were connected at one extremity to the bone, while the other extremity was loose towards the cavity of the joint, and having no lateral connection with each other. The intervertebral cartilages connecting the bodies of some of the dorsal vertebræ were also in a diseased state. They retained the usual appearance of concentric layers towards the circumference, but in the centre, instead of the white semi-fluid substance, which is met with under ordinary circumstances, they were found to be of a brown colour, of a solid and somewhat brittle texture, composed of several portions having a very slight adhesion to each other. The ligaments, the synovial membranes, and the bones, were all in a natural state, except that the latter were occasionally carious in consequence of the absorption of the cartilage; but the caries was unattended by the formation of matter.

In this case the original disease appears to have been a morbid state and subsequent ulceration of the cartilages. It shews that where the disposition to it exists, the destruction of the cartilage may take place in several joints at the same time, and I have observed the same thing in many other instances.

The conversion of the cartilage into a soft fibrous structure, I am disposed to believe, is the frequent, though not the constant, forerunner of

ulceration. In a woman, who died a week after a severe contusion of the hip, the cartilage of the head of the femur was found in some parts entirely absorbed, in others having a fibrous appearance similar to what has been described, and I have noticed the same circumstance in other cases, sometimes connected with, and sometimes independent of, local injury.

CASE XII.

In another body, which had been brought into the dissecting room, the nates on one side were wasted, and flattened in their form, having the appearance which they assume in the ordinary cases of disease in the hip-joint: and this was very distinct, so that it was observed by the students, as well as by myself, and it led me to examine the hip-joint on that side.

The capsular and round ligaments, the synovial membranes, the fatty substance of the joint, and the bones were all in a perfectly natural state. The cartilage covering the head of the femur for the extent of a sixpence on one side of the round ligament was partially absorbed, and what remained of it converted into a fibrous structure, similar to what was observed in the last case.

This dissection might lead to the suspicion that the first stage of the ordinary disease of the hip-joint, consists in an absorption of the cartilage from one, or both of the bones composing it; at the same time, no positive conclusion can be drawn from it, since the same appearance of the nates is produced occasionally from other causes, and I had no opportunity of learning what other symptoms had existed previous to death.

CASE XIII.

A boy ten years of age was admitted into St. George's Hospital in April, 1809, on account of a disease of the left hip. The nates were wasted, and flattened; there was pain in the hip and knee, and a large abscess had formed which produced a tumor on the outside of the thigh. An issue was made with caustic behind the great trochanter. About a month after his admission, the skin over the abscess having become inflamed, I made an opening in it with a lancet, and half a pint of pus was evacuated. The orifice, made by the lancet, healed by the first intention, but in a few days, pus was again collected in the abscess, and the tumor was larger and more tense than ever. The limb became shortened; the abscess burst externally; the boy became affected with hectic symptoms, and died on the 21st of October.

On examining the body, the abscess was found communicating with the cavity of the left hip. The capsular ligament, and synovial membrane, were not distinguishable from the other soft parts, forming the parietes of the abscess. There was no vestige of the round ligament, and no remains of cartilage on either of the bones composing the joint. The head of the femur was reduced by caries to about one half of its natural size, and from the same cause, the acetabulum was rendered deeper and wider than is natural. At the posterior part, the margin of the acetabulum was more extensively absorbed, and the head of the femur had been drawn out of its cavity, and was lodged on the dorsum of the ilium.

No other disease had been suspected to exist during life. If the boy had ever complained of pain in the right hip, the circumstance had been overlooked on account of the greater disease in that of the opposite side. Having accidentally cut into the joint of the right hip, I found the cartilage, covering the head of the femur, absorbed for about $\frac{1}{3}$ of its extent, and the surface of bone which was in consequence exposed, was covered by a thin layer of coagulable lymph. The cartilage lining the acetabulum, and all the soft parts belonging to the joint, were in a perfectly natural state, and the bones were of the ordinary texture and hardness.

CASE XIV.

A girl, seven years of age, was admitted into St. George's Hospital in May, 1809, on account of a complaint in the left hip. She had pain in the knee, the limb was shorter than is natural, and the nates were wasted and flattened. An issue was made with caustic behind the great trochanter. Soon after her admission an abscess burst near the crista of the ilium. The disease in the hip appeared to be considerably relieved, but on the first of August she died of an accidental attack of erysipelas.

On inspecting the body, the glutæi muscles of the left side were found wasted, and of a dark colour. A sinus extended from the external orifice of the abscess through the soft parts, and communicated with the hip-joint by an ulcerated opening in the margin of the acetabulum.

There were no remains of cartilage on the surface of the acetabulum. The exposed bone was in a carious state, and of a dark colour, and the cavity of the acetabulum was rendered deeper and wider than is usual. The greater part of the cartilage was destroyed on the head of the femur, and the small portion of it which remained, was readily separated from the bone. This circumstance is often met with where cartilage is undergoing the process of ulceration.

The capsular ligament was somewhat thicker than under natural circumstances, and more connected with the surrounding parts. There were no remains of the round ligament.

In the anterior part of the joint, a quantity of organized soft substance, resembling that of adhesions, was interposed between the head of the femur and the acetabulum, and behind this was a collection of dark-coloured pus. From these two causes the head of the femur had been separated from the os innominatum, and pushed outwards, and it had afterwards been drawn upwards by the action of the muscles, so that it was lodged on the superior part of the bony margin of the acetabulum. The synovial membrane was of a dark colour, but not otherwise diseased.

On examining the hip of the opposite side, I found the soft parts external to it, the capsular ligament, synovial membrane, and fatty substance of the joint, having no appearance of disease. The cavity of the joint contained about a drachm of dark-coloured pus. The cartilage was absorbed from about $\frac{1}{3}$ of the surface of the acetabulum, but the exposed bone presented no appearance of caries. In some parts of the head of the femur, the cartilage had a fibrous appearance, similar to what has been already described; in other parts it was entirely absorbed, and a carious surface of bone was exposed; and elsewhere it was in a natural

state. The round ligament was ruptured by a very slight degree of force, which seemed to arise from the cartilage having been destroyed round its insertion into the acetabulum.

The bones in the neighbourhood of the carious surfaces of the left hip were of a darker colour than usual; but no such appearance was observed in the bones of the other hip, which were in all respects in a healthy state.

CASE XV.

William Bridges, 21 years of age, was admitted into St. George's Hospital, on the 28th of November, 1810. He gave the following account of his complaint. About the middle of the May preceding he first experienced a pain in the right knee, which was aggravated by walking. At the end of a month, the pain became so severe that he was under the necessity of being confined to his bed. He had slight pain in the hip; but that in the knee was intense, keeping him awake at night. An abscess formed, which in the September following burst on the inside of the thigh.

At the time of his admission, the nates were wasted and flattened; the limb on the affected side was an inch and a half longer than the other;

there was a large abscess in the posterior part of the thigh. He was emaciated, and laboured under a hectic fever. An issue was made with caustic behind the great trochanter of the femur, and afterwards a second issue was made in the same manner on the anterior edge of the tensor vaginæ femoris muscle. Under this treatment he experienced for a time great relief, notwithstanding several abscesses burst in different parts of the thigh. He became free from pain; regained his flesh; the hectic fever abated; and the discharge from the abscesses was much lessened. The limb now appeared to be shorter than the other. He continued to mend, till the middle of February, 1811. At this period, the former bad symptoms began to return. He was affected with a constant diarrhœa, and profuse perspirations, and he died on the 26th of March following.

On inspecting the body, the glutæi muscles were found wasted and shrunk, and in many parts their texture was destroyed by the abscesses, which communicated with the cavity of the joint by two ulcerated openings, one on the anterior, and the other on the posterior part. The abscesses formed several sinuses in the neighbourhood of the joint, and the capsular ligament was in consequence connected to, and in some measure blended with, the other soft parts.

The joint contained purulent matter. The sy-

novial membrane was darker than natural, but otherwise had the ordinary appearance. There were no remains of the round ligament. The cartilages were everywhere absorbed, and the exposed surfaces of bone were in a carious state. The head of the femur was reduced to about $\frac{2}{3}$ of its original size, and the acetabulum was rendered deeper and wider, nearly in the same proportion. At the bottom of the acetabulum there was an ulcerated opening, just large enough to admit a common probe, communicating with an abscess within the pelvis. The carious surfaces of the bones had the same dark colour and fœtid smell as in other cases of caries, but otherwise they did not differ from healthy bones.

I could add to the foregoing an account of the dissection of several other cases, in which the hip was affected with the same disease, but it would be only unnecessarily occupying the time of the Society. It will be sufficient to observe, that,

1. In the most advanced stage of the disease, none of the parts entering into the composition of the joint retain their natural structure. The soft parts are blended into a confused mass. Sometimes the head of the femur is completely destroyed by the caries, and there remains only the neck, or a part of the neck, of the bone. Often the projecting margin of the acetabulum is entirely absorbed, so that, instead of a cavity, there is

only a broad carious surface of the os innominatum. In a few instances, a portion of the carious bone is found dead, and undergoing the process of exfoliation, or having already exfoliated into the cavity of the joint.

2. In whatever period of the disease the examination is made, the cartilages are found in a state of ulceration; but the morbid affection of the soft parts and bones varies very much, nor are they much altered from their natural state, except in the most advanced stage of the malady.

From these circumstances, from the presumptive evidence afforded by the 6th Case, and from the appearances in the two following, in which, while the disease had made considerable ravages in one hip, it was in an incipient stage, and wholly confined to the cartilages in the other, we may be justified in concluding, that, in the ordinary cases of caries of the hip, the cartilage is the part primarily affected, and the following may be stated to be the progress of the disease.

1. Ulceration takes place in the cartilages: generally in that of the acetabulum first, and in that of the head of the femur afterwards; sometimes it begins in both at the same time.

2. The ulceration extends to the bones, which become carious; the head of the femur is dimi-

nished in size, and the acetabulum is rendered deeper and wider.

3. Abscess forms in the joint, which after some time makes its way, by ulceration, through the synovial membrane and capsular ligament, into the thigh or nates, or even through the bottom of the acetabulum into the pelvis. Mr. Astley Cooper has shewn me two specimens, in each of which the abscess had burst into the rectum.

4. In consequence of the abscess, the synovial membrane and capsular ligament become inflamed and thickened. The muscles are altered in structure; sinuses are formed in various parts, and at last all the soft parts are blended together into one confused mass, resembling the parietes of an ordinary abscess.

In giving this statement, it cannot be intended to assert, that the hip is not liable to other morbid affections; and, of course, disease having its origin in the bones or soft parts may ultimately occasion destruction of the cartilaginous surfaces in this as well as in other joints; but still the conclusion remains, that in the ordinary disease of the hip joint, in that disease which an intelligent surgeon, in a work written expressly on the subject, has denominated "the scrophulous caries of the hip," the ulceration of the cartilages is the primary affection, and the other parts, in and near the joint, become affected only in a secondary manner.

The appearances observed on dissection explain some of the symptoms by which the existence of this disease is indicated.

1. The glutæi muscles, from want of use, gradually become wasted and flabby. The nates, in consequence, are less prominent than is natural, and this gives them the appearance of being increased in breadth, when, on measurement, no such increase is found to exist *. In some instances even, the nates, on a superficial examination, appear to the eye to be wider than natural, when they are in fact narrower, in consequence of the bones composing the hip having been in part destroyed by ulceration. There are, however, a few cases, where, from the acetabulum being filled with coagulable lymph and matter, the head of the femur is pushed out of its proper situation, and the increased breadth of the nates is not only apparent but real.

2. When the disease is in its most advanced stage, the head of the femur is sometimes com-

* This alteration in the form of the nates is a symptom, but is not to be considered as a diagnostic mark of disease in the hip-joint, since it may be observed in other cases, where from any cause the glutæi muscles have been for a considerable time in a state of inaction. Thus children are subject to a paralytic state of the muscles of the lower limbs, and in this complaint, if the muscles are affected as high as the pelvis, the nates present to the eye precisely that appearance, which is described above. The difference of the other symptoms enables us to distinguish the two diseases.

pletely destroyed, and the muscles pull the great trochanter upwards towards the crista of the ilium. This may be compared to the fracture of the neck of the femur, and the appearance of the limb is the same as after this injury. The toes are generally turned outwards, and the limb is shortened. It sometimes happens that the limb is shortened, the thigh bent forwards, the toes turned inwards, and there is every symptom existing of a dislocation of the hip, upwards and outwards. The following case fully explains the cause of these appearances.

CASE XVI.

——— Taylor, a middle-aged man, was admitted into St. George's Hospital, in the autumn of 1805, on account of a disease in his left hip. He laboured also under other complaints, and he died in the February following.

On inspecting the body, the soft parts in the neighbourhood of the joint were found slightly inflamed, and coagulable lymph had been effused into the cellular membrane round the capsular ligament.

There were no remains of the round ligament.

The cartilages had been destroyed by ulceration, except in a few spots.

The bones on the exposed surfaces were carious; but they retained their natural form and size. The acetabulum was almost completely filled with pus and coagulable lymph: the latter adhering to the carious bone, and having become highly vascular. The head of the femur was lodged on the dorsum of the ilium. The capsular ligament and synovial membrane were much dilated, and at the superior part, their attachment to the bone was thrust upwards, so that although the head of the femur was no longer in the acetabulum, it was still within the cavity of the joint.

Since the man did not attribute this disease to any local injury, we may conclude that the ulceration of the cartilage was the primary affection, and that the dislocation had been produced, in consequence of the head of the femur having been first pushed outwards by the coagulable lymph and pus, which occupied the cavity of the joint, and then drawn upwards by the action of the muscles inserted into the great trochanter.

As, from the peculiar situation and connexions of the hip, affections of this part are attended with particularly serious consequences, I trust that the foregoing descriptions will not be considered as given too much in detail, especially as it will prevent the necessity of entering with much minuteness into the history of the ulceration of the cartilages of other joints, in which the progress of the dis-

ease, allowance being made for the difference of structure and situation, is the same as in the hip.

CASE XVII.

David Martin, 26 years of age, was admitted into St. George's Hospital on the 25th of July, 1810, on account of a disease in his right knee. He attributed it to a blow which he had received some years previous; but he said, that the symptoms had all been much aggravated within the last six months. At the time of his admission into the hospital, the knee had the appearance of being swollen; but on examination, this was found to arise from the wasting of the muscles, rather than from actual enlargement. The leg was fixed, or nearly so, in the half bent position. The condyles of the femur projected beyond the head of the tibia. He complained of pain, which was particularly severe at night.

An issue was made with caustic on each side of the patella; but the symptoms were not relieved, and an abscess burst on the outside of the joint, discharging a large quantity of matter.

Soon after his admission, he experienced, for the first time, severe pain in the other knee; but

this was unattended by swelling, or any alteration in the form of the joint, and the leg admitted of complete extension and flexion on the thigh. The pain continued, but no swelling ever took place.

In the beginning of September, he was seized with an accidental attack of erysipelas. Abscesses formed in different parts of the leg and thigh; and he gradually sunk, and died on the 7th of November.

On inspecting the body, the right leg was found bent so as to form a right angle with the thigh. The head of the tibia had been drawn towards the ham by the action of the flexor muscles, so that the condyles of the femur were unusually protuberant. The lateral ligaments were in a natural state. There were no remains of the crucial ligaments, or semilunar cartilages. The cartilages of the tibia, femur, and patella had been entirely absorbed. The bones were carious on their exposed surfaces, but not otherwise diseased. The synovial membrane was free from all morbid appearances except at the points of its attachment to the bones, where, in a few places, coagulable lymph had been effused on its surface.

The left knee, externally, had its natural appearance with respect both to form and size. The leg admitted of complete flexion and extension.

On dissection, the ligaments and synovial membrane were found in a perfectly healthy state; but about $\frac{1}{3}$ of the cartilaginous surfaces of the tibia and femur were destroyed by ulceration, the ulceration having taken place principally, but not entirely, near the circumference. The cartilage of the patella and semilunar cartilages were entire, but the latter, in some parts, were softer than usual. The bones were free from disease. There was no pus or other fluid in the joint.

The dissection of this case, in which the ulceration of the cartilaginous surfaces was evidently the primary disease, explains well the nature of, at least, many cases of that species of white-swelling, which some authors have described, in which there is long continued and severe pain in the joint, before any tumor is observable.

CASE XVIII.

William Bowles, 18 years of age, was admitted into St. George's Hospital on the 1st of December, 1810. He said, that about eleven months previous to his admission, he was seized with pain in his right knee, which was so severe as to keep him frequently awake at night. Six weeks after the pain attacked him, the joint, for the first time, became swollen. He now applied to a practitioner,

under whose treatment, joined with perfect rest, the pain and swelling subsided, so that he was able to walk about. In the September following, having returned to his usual occupations, and used the joint a good deal, the pain and swelling returned.

At the time of his admission the affected knee was about $1\frac{1}{2}$ inch in circumference larger than the other. The swelling had the form of the articulating ends of the bones. The leg was half bent, and all attempts to give it motion gave great uneasiness. The pain which he experienced, was great at all times, but particularly at night, when it very much disturbed his rest.

Soon after his admission, an abscess was discovered on the outside of the knee, which burst in the beginning of February, and discharged a large quantity of matter. On the 18th of March, the limb was removed by amputation.

On examining the joint, the greater part of the cartilaginous surfaces of the tibia, femur, and patella were found destroyed by ulceration. Where the cartilage was destroyed, the exposed bone was carious, and in some places covered by a thin layer of coagulable lymph; but in other respects, the bone was free from disease. There were scarcely any remains of the semilunar cartilages. The joint contained pus, and the abscess in the joint had made its way into the external parts

through an ulcerated opening in the synovial membrane. The synovial membrane was in a natural state, except that, in a few places, there was a thin layer of coagulable lymph on its surface, which, evidently, had been recently effused. The external lateral ligament was destroyed by the abscess: the other ligaments were entire.

In this case, the principal disease observed in the dissection, was the ulcerated state of the cartilages. There was no affection of the synovial membrane beyond what might be considered as arising from the formation of pus in the joint, and the bursting of the abscess externally. Where inflammation of this membrane is the primary disease, swelling takes place often in a few hours, always within two or three days from the beginning of the attack; whereas in this instance, the constant answer, which the patient gave to the repeated enquiries made of him, was, that he had had violent pain for six weeks before the joint was observed to be enlarged. From all these circumstances, we may conclude, that in this case as well as in the last, the cartilages were the original seat of the disease, and that the morbid appearances observed in the soft parts were the consequence of the formation of the abscess in the joint.

CASE XIX.

Jane Bannister, 40 years of age, was admitted into St. George's Hospital in September, 1810, on account of a disease in her right foot. She gave the following account of her case.

In the September of the preceding year, she wrenched her instep, and soon afterwards experienced violent pain in this part, so that she was unable to stand on the foot, and her rest was much disturbed at night. The pain continued very severe, and at the end of four months, she observed, for the first time, a slight swelling on the inside of the foot. This was occasioned by an abscess, which was opened by her medical attendant in the April following.

At the time of her admission into the hospital, the whole foot was swollen, and she complained of violent pain in it. The abscess continued open, discharging a small quantity of pus. On introducing a probe into the orifice, an exposed surface of bone was felt. Several applications were made without benefit, and the leg was amputated on the 25th of February, 1811.

On examining the amputated foot, the cartilages of the joint formed by the astragalus and os naviculare were found destroyed by ulceration,

and a portion of the astragalus was dead, and undergoing the process of exfoliation. The cartilages of the joints formed by the cuneiform bones with each other, with the os naviculare, and with the metatarsal bones were in like manner destroyed, and the exposed surfaces of bone were carious. The abscess communicated with the carious joints. The ligaments and synovial membrane were in a natural state, except in a few spots, where they were destroyed by the abscess. The bones possessed their natural texture and hardness. The cellular membrane of the foot contained coagulable lymph and serum.

From the previous history, as well as from the appearances on dissection, there can be as little doubt in this case as in either of the two preceding, that the original disease was the ulceration of the cartilaginous surfaces, and that the other parts were affected only in a secondary manner.

It would be needless to add to the foregoing, an account of other cases, in which the disease was in a still more advanced stage. The progress of it in other joints, corresponds with that in the hip, and whatever may be the joint affected, there is ultimately the same complete destruction of the cartilages, and the same extensive ravages are committed among the bones and soft parts.

In one of the cases related in this section, where

ulceration of the cartilages had begun in several other joints, those between the bodies of some of the dorsal vertebræ were very much altered from their natural structure, and this circumstance rendered it probable, that in the ordinary cases of caries of the spine, the disease has its origin in the intervertebral substance, and that it corresponds to the ulceration of the cartilage in other joints. In cases of this disease, which I have examined after death, the appearances have tended to confirm this conclusion, as I have found the destruction of the intervertebral cartilages to be greater than that of the vertebræ themselves, and the caries of the last has been either entirely confined to, or most extensive on, those surfaces, to which the cartilages had been connected. The following case, which came under the observation of Mr. Howship, and the particulars of which he communicated to me, appears to complete the evidence on this subject.

CASE XX.

Christiana Clear, a girl eight years of age, was admitted into the Infirmary of St. George's parish, in the year 1808, on account of a disease of the spine. At this time the upper part of the spine was bent forward, and the spinous processes of some of the dorsal vertebræ, formed a preternatu-

ral projection at the posterior part; but still, she was able to walk without assistance.

Soon after her admission, an abscess formed and burst in the groin; and this was followed by a second which burst near the former.

The child was now forced to be confined entirely to her bed. The abscesses continued to discharge pus. She became affected with hectic fever; nevertheless more than two years elapsed, from the time of her having been first admitted into the infirmary, before she died.

On inspecting the body, it was found to be universally anasarcous. The abdominal muscles were so wasted that scarcely any vestige of them was observable. This, probably, arose from the child having remained in bed for so long a period previous to her death, and having scarcely ever varied her position.

At the posterior part of the abdomen, there was a confused mass of soft substance, which proved to be the parietes of an abscess communicating with the orifices in the groin.

The bodies of the lowest dorsal, and three superior lumbar vertebræ were found at the posterior part of the abscess nearly consumed by the caries.

There were no remains of the intervertebral cartilage between the 10th and 11th dorsal, nor of that between the 3d and 4th lumbar vertebræ. These intervertebral spaces were filled with pus, and the opposite surfaces of the vertebræ were carious, but only in a slight degree. The central part of the intervertebral cartilage, between the bodies of the 9th and 10th dorsal vertebræ, was completely absorbed, and pus was found in its place. Externally to this abscess, the concentric layers of elastic cartilage were entire, though somewhat altered from their natural appearance.

The case just related, and the circumstances before mentioned, seem to warrant the conclusion, that, in the ordinary cases of caries of the spine, the disease is, originally, an ulceration and abscess of one or more of the intervertebral cartilages, beginning in the centre, and extending to the circumference, and afterwards affecting the bodies of the contiguous vertebræ*.

* Mr. Pott, in his treatise on the disease of the spine, speaks of it as shewing itself in a variety of forms, "sometimes in that of a thickened state of the ligaments," "sometimes in that of a distempered state of the intervertebral cartilages," "sometimes in that of diseased glands," &c. There can be no doubt that the spine is subject to many morbid affections; but I believe it will be found that the symptoms described by Mr. Pott, attended with a curvature of the spine forwards, and projection of the spinous processes backwards, are produced only by the disease described above, and that it is this disease only, which is relieved by

After stating these facts, it is however proper to mention, that I have examined some cases, in which the spine was carious, and in which the bodies of the vertebræ were extensively destroyed, while the intervertebral cartilages were very little, or not all affected: but in all cases of this kind, which have come under my observation, the caries was evidently not the original affection, but the consequence of some other disease external to the spine. Thus, where an abscess has formed in the psoas muscle, or in the cellular membrane, which surrounds it, the matter resting on the vertebræ occasions caries of the bones, but not of the cartilages between them; so that in some instances, where the disease has been of long continuance, the former have been found extensively destroyed, while the latter have remained projecting almost of their natural size.

In some cases, the ulceration of the cartilage of a joint begins on that surface, which is connected to the bone, and from having observed this circumstance, I was at first led to adopt an opinion which I heard stated to have been that of Mr. Hunter, and which appeared to be warranted by the small degree of vascularity which cartilage possesses, that ulceration of it takes place, not from the action of its own

by the method of treatment which he has recommended. The lateral curvature of the spine is a different affection, being, in general, the consequence of a soft or rickety state of the bones,

vessels, but in consequence of it being acted on by the vessels of the bone, to which it is connected. I afterwards found, that in many instances, previously to ulceration, the cartilage undergoes a remarkable change of texture, becoming soft, and assuming a fibrous appearance; thence I was led to conclude that this opinion is not altogether correct, and I now am able to adduce the two following cases, which seem to prove that cartilage, as well as other parts, is capable of ulcerating from the action of its own vessels.

CASE XXI.

A boy, 12 years of age, on the 28th of June, 1809, fell from a height, and pitched on one of his knees. When he was brought to the hospital, he was found to have a compound fracture of the femur. For some days he appeared to go on well, but afterwards an abscess formed in the thigh extending as high as the nates; and he sunk and died on the 21st of July. On examining the knee-joint after death, the cartilage covering the condyles of the femur, and that covering the head of the tibia was found, in some parts, entirely absorbed, so that the bone was exposed; and in other parts it was absorbed on the surface towards the cavity of the joint, while the layer of it next to the bone retained its natural adhesion, and its natural structure. The cartilage, in these parts,

was formed into grooves, having an appearance as if the greater portion of its substance had been removed with a chissel.

CASE XXII.

A middle-aged man met with an injury of the knee, which was followed by inflammation and suppuration, and he died in St. George's Hospital on the 30th of August, 1809.

On examining the joint after death, the cartilage covering the condyles of the femur, and the head of the tibia, was found entirely destroyed towards the circumference, so that the bone was exposed. Elsewhere, only a thin layer of cartilage remained; but this had its ordinary texture, and adhered as firmly as usual to the bone.

As in these cases the cartilage was absorbed on the surface towards the cavity of the joint, while the remainder still adhered to the bone, it is evident that the absorption must have taken place from the vessels of the cartilage itself.

In young persons, before the period of growth is over, the articular cartilages possess more vascularity than in others, so that their vessels are distinctly to be seen, and admit of being injected,

which is not the case in adults; and this explains why the ulceration of the cartilage takes place more frequently, and makes more rapid progress in the former than in the latter.

When the disease, which has been described in this present section, has made very considerable progress, if the patient recovers so as to preserve the limb, he seldom has the use of the joint afterwards, the bones composing it being united by anchylosis; but if it has been checked in a less advanced stage, even though the whole of the cartilages have been destroyed, the patient may retain the natural motion of the joint. In these cases, I have no reason to believe that there is ever any attempt at the regeneration of the cartilage. In some instances a smooth, compact layer of bone is formed on the carious surface, nearly similar to what is seen in a healthy bone, after the cartilage is destroyed by maceration. I have many times, in dissection, observed a considerable portion of the cartilage of a joint wanting, and in its place a thin layer of hard, compact, semitransparent substance, having an irregular granulated surface. It is probable, that in these cases the original disease had been ulceration of the cartilage. In a subject in the dissecting-room, I found no remains of cartilage on the bones of one hip, but in its place, a crust of bony matter was formed, of a

compact texture, of a white colour, smooth, and having an appearance not very unlike that of marble. I suspected this also to have been a case, in which the patient had recovered after ulceration of the cartilage, and this opinion was rendered more probable by the following case, which afterwards occurred.

CASE XXIII.

A woman, 36 years of age, was admitted into St. George's Hospital with pain in the hip and knee on one side. The nates were wasted and flattened, and a large abscess had burst, leaving a sinus communicating with the hip-joint. She was affected with hectic fever, and she gradually sunk and died. On inspecting the body, various sinuses were found in the neighbourhood of the hip, and communicating with it.

The synovial membrane and capsular ligament had undergone no alteration in their appearance beyond what evidently depended on the abscess. The cartilage was every where absorbed from the articulating surfaces, and in its place, there was a white polished surface, similar to that which has been just described.

§ 6. *On the Scrophulous Affection of the Joints.*

The term scrophula is often employed without much precision, and indeed it is not always easy to determine what symptoms ought, and what ought not, to be referred to this disease. It has been usual to regard nearly all the affections of joints as scrophulous, and I believe it may be found that persons having a predisposition to scrophula are, on the whole, more liable than others to those affections which form the subject of the preceding sections. As, however, they occur very frequently, where no such pre-disposition exists, there seem to be no sufficient grounds for considering them as having any necessary connection with it; and it can be no more proper to designate these as scrophulous, than it would be to denominate inflammation of the synovial membrane a mercurial disease, because it occasionally arises from the use of mercury. But there is another malady which affects the joints, having all the characters of scrophula; occurring only in persons having a scrophulous appearance, and usually preceded by, or combined with, other scrophulous symptoms.

In the scrophulous disease of the joints, the bones are primarily affected, in consequence of which ulceration takes place in the cartilages covering their articulating extremities. The car-

tilages being ulcerated, the subsequent progress of the disease is the same as where this ulceration takes place in the first instance.

CASE XXIV.

Charles Miller, twenty years of age, having blue eyes, light hair, and a fair complexion, was admitted into St. George's Hospital, in April, 1808, on account of a disease in one foot. The whole foot was swollen and œdematous, with two fistulous sinuses, one on the inside and the other on the outside, through which a small quantity of scrophulous matter was discharged. A probe being introduced into either of these sinuses, some exposed pieces of bone might be distinguished.

On the 16th of May, the limb was amputated below the knee.

On examining the amputated foot, the muscles were found pale and wasted from want of use, and the cellular membrane was distended with serum and coagulable lymph.

The extremities of the tibia and fibula, all the bones of the tarsus, and the extremities of the bones of the metatarsus, contained much less earthy matter than is usual. They were so soft

that they might be cut with a scalpel, without the edge of it being turned. They were preternaturally red and vascular, and a yellow cheesy substance was deposited in the cancelli. The cartilage at the base of the fifth metatarsal bone was destroyed by ulceration. Those at the bases of the three middle metatarsal bones were also destroyed, and the exposed surfaces of bone were dead, and undergoing the process of exfoliation. The cartilages of all the other bones were in a natural state. Pus and coagulable lymph was effused in the neighbourhood of the dead and carious bones; and the sinuses communicated with them. The synovial membrane and ligaments were in a natural state, except where destroyed by the abscesses.

CASE XXV.

John King, 26 years of age, having blue eyes, thick lips, and a florid complexion, was admitted into St. George's Hospital, on the 1st of June, 1811, on account of a complaint in his right ancle and foot. I received the following account of his case, partly from himself, and partly from a medical gentleman, who was in the habit of seeing him before he came into the hospital.

About the end of May, 1810, he wrenched his

foot. The instep and ancle became swollen and painful, but in a few days these symptoms subsided. During the summer he experienced slight pain and weakness of these parts whenever he took more than his usual quantity of exercise; but in October a slight tumefaction was observed on each side of the ancle, and the pain was more severe, but still not sufficient to prevent his going about his usual occupations. About the middle of December the pain became more violent, and he was confined to the house for a fortnight; after this the pain abated, so that he was able to go about with the assistance of a crutch.

In March, 1811, an abscess burst on the outside of the foot. The formation of the abscess was not attended with any considerable degree of pain.

He formerly had been supposed to labour under incipient *phthisis pulmonalis;* but from the time of the disease having been begun in his foot, he suffered no inconvenience from the complaint in his lungs.

At the time of his admission into the hospital, there was a diffused œdematous swelling of the soft parts over the whole foot and ancle. On the outside there were the orifices of three or four sinuses, which had burst at different periods. He had very little pain, even on motion or pressure. Soon

after his admission, another abscess broke on the inside of the heel. On the 11th of July, the leg was amputated.

On examining the foot, the cells of the cellular membrane were found distended with serum and coagulable lymph.

All the bones had undergone a morbid change, similar to what was observed in the last case, except that they were still softer, and more vascular. The cartilages of the ancle were completely destroyed by ulceration, and the exposed surfaces of bone were in a state of caries. The cartilages of the tarsus were entire, but, in some places, of a red colour, and this was found to arise from vessels loaded with red blood, extending into them from the bone. The ligaments and synovial membranes of the tarsal joints were in a natural state, as were also those of the ancle, except where they had been destroyed by the abscesses.

CASE XXVI.

This patient was a soldier in the Coldstream Guards; I once had an opportunity of seeing him before amputation was performed, and, through the kindness of the medical officers of the regiment, I was favoured with the previous history of

the complaint, and with the opportunity of examining the amputated joint.

William Miles, twenty years of age, of a delicate complexion, with red hair and dilated pupils, was attacked with a slight pain and swelling of the left knee, about the middle of January, 1808. On keeping quiet for a few days the swelling subsided; but it returned about the end of March, though still attended with very little pain. He was received into the hospital of the battalion at Chatham, and, on the 9th of June following, he was sent to the regimental hospital in London.

At this time the diseased knee measured in circumference three inches more than the other. Fluid was felt external to the joint, and in the cavity of the joint itself. The leg was kept extended, and all attempts to bend it gave considerable pain; but otherwise the pain which he endured was trifling, amounting only to a slight degree of uneasiness deep-seated in the joint. On the 8th of July, an abscess burst near the inner edge of the patella, and discharged about eight ounces of thin pus. On the 27th of July the limb was amputated.

On examining the knee, the articulating extremities of the tibia and fibula were found so soft that they were readily cut by a common knife: they contained much less earthy matter than is

usual, and their cancelli were filled by a yellow cheesy substance.

The cartilage covering the head of the tibia was destroyed by ulceration in a few spots at the margin. That of the femur was eroded for a very small extent behind the crucial ligaments. The patella, and the cartilage covering it were in a natural state. Coagulable lymph, having a gelatinous appearance, had been effused into the cellular membrane, on the outside of the synovial membrane. Pus was found external to the joint, and in the joint itself.

The preceding cases sufficiently illustrate the nature and progress of this disease. The morbid affection appears to have its origin in the bones, which become preternaturally vascular, and containing a less than usual quantity of earthy matter, while, at first, a transparent fluid, and afterwards a yellow cheesy substance, is deposited in their cancelli.

From the diseased bone vessels carrying red blood shoot into the cartilage, which afterwards ulcerates in spots, the ulceration beginning on that surface which is connected to the bone. The ulceration of the cartilage often proceeds very slowly. I have known a knee amputated on account of this disease, in which the cartilage was absorbed, for not more than the extent of a sixpence.

Occasionally, but not often, a portion of the carious bone dies, and exfoliates.

As the caries of the bones advances, pus is collected in the joint. At last the abscess bursts externally, having formed numerous and circuitous sinuses.

Inflammation takes place of the cellular membrane, external to the joint. Serum, and afterwards coagulable lymph, is effused, and hence arises a puffy elastic swelling in the early, and an œdematous swelling in the advanced, stage of the disease.

Scrophula attacks only those bones, or portions of bones, which have a spongy texture, as the extremities of the cylindrical bones, and the bones of the carpus and tarsus; and hence the joints become affected from their contiguity to the parts which are the original seat of the disease. I have never met with an instance of the alteration of structure, which has been just described, in the cranium, nor in the middle of the cylindrical bones.

Examples of this disease occur in almost every joint of the body, but oftener in those of the carpus and tarsus than in any other. In one instance which came under my notice, nearly all the joints

of the body were affected at the same time in the same individual.

It should be observed, that in some other cases besides those of scrophulous affection, the bones are found to be more or less altered from their natural texture. When a bone is extensively carious, it appears as if the absorption of the earthy part takes place more rapidly than that of the animal matter, and hence it becomes preternaturally soft in the neighbourhood of the carious surface, at the same time that it assumes a dark colour and has a fœtid smell, from the lodgment of matter in the cancelli. In cases where a disease has evidently originated in the soft parts of a joint, I have occasionally found the bones to have lost much of their original hardness of texture, though the alteration has been in a much less degree than in scrophulous bones, and without the deposition of yellow cheesy substance in the cancellous structure. Some circumstances induce me to suspect that mere want of use is sufficient to occasion a deficiency in the secretion of phosphate of lime, and, indeed, the analogy of what may often be observed after a fracture, renders this highly probable. When the two broken ends of a bone have become united by callus, the callus, in some instances, does not become ossified, while the patient continues in bed, and in a state of rest; but if he moves about on crutches, and exer-

cises the limb, the ossification is speedily produced.

The diseases which have been described in the foregoing sections are those of the most frequent occurrence. There are some other affections to which the joints are liable, but a brief notice of these will be sufficient.

1. Occasionally inflammation takes place on the articulating extremity of a bone, and an abscess forms and bursts into the joint. Where this happens, there is sometimes a fresh formation of bony matter in consequence of inflammation, and ossification of the periosteum, and this constitutes the only species of diseased joint which has come under my own observation, in which an actual enlargement of bone takes place. Where the soft parts of a joint are considerably thickened, a feeling is sometimes given to the hand, as if the bones themselves were increased in size; but my friend Mr. Lawrence, some years ago, observed and pointed out that this feeling is deceptive.

2. I have known an instance, in which, without any evident cause, a large portion of the head of the tibia died, and exfoliated, and the destruction of the knee-joint was the consequence.

3. The loose bodies, which are occasionally found in a joint, have been so frequently described by writers, that it might appear unnecessary to offer any observations on the subject. But I have met with two cases in which the loose bodies were of a different nature, and had a different origin, from those which are ordinarily met with. It not unfrequently happens, that from some morbid action, a bony ridge is formed, like a small exostosis, round the margin of the cartilaginous surfaces of the joint. In the two instances, to which I allude, this preternatural growth of bone had taken place, and in consequence of the motion of the parts on each other, portions of it had been broken off, and lay loose in the cavity of the joint.

4. The effects of gout on the joints are very remarkable. The cartilages are absorbed: the exposed surfaces of bone, are entirely, or partially, encrusted with white, earthy matter, which I conclude to be urate of soda, and sometimes they have the appearance of being formed into grooves, as if they had been worn from their friction on each other. In some cases, repeated and violent attacks of gout occasion complete anchylosis.

I am induced to hope, that the foregoing observations will be found to lay the foundation of a

better arrangement of the diseases of joints, than that which has usually been adopted: but I am well aware that the subject is by no means exhausted. I shall endeavour to avail myself of such opportunities as may occur of prosecuting the investigation further, and, in the mean time, I beg the indulgence of the Society for not having already rendered it more perfect. The study of pathology is indeed attended with peculiar difficulties. There is no science in which a greater number and variety of facts demand our notice; none in which a just and accurate knowledge of facts is less easy to be obtained; or in which the phænomena are so little capable of being reduced to general laws. A multitude of causes, too minute to be detected, silently operate, sometimes to modify and alter the effects of the same morbid action; at other times, to give a similar form and character to different diseases. Particular periods and particular climates produce their own peculiar maladies; and hence, the labours of those who have gone before us, or who have made their observations in other countries, are often of little service towards promoting the researches in which we ourselves may be engaged. All these circumstances render it impossible to bring pathology to that degree of perfection, which has been attained in some other branches of knowledge; but the difficulty of the science does not render it less important to human nature, nor less necessary to be pursued by those engaged in the medical profession.

OBSERVATIONS

ON

THE CATARACT.

By BENJAMIN TRAVERS, Esq.

DEMONSTRATOR OF ANATOMY AT GUY'S HOSPITAL.
SURGEON TO THE HON. EAST-INDIA COMPANY, AND TO THE
LONDON INFIRMARY FOR DISEASES OF THE EYE.

Read July 13, 1813.

OPACITY is the result of inflammation in a transparent part, as is seen in the scarf-skin, the conjunctiva, the cornea, the crystalline and vitreous humours of the eye, and their membranes. If the inflammation is arrested before it reaches the stage of effusion, the opacity, which probably depends upon the turgescence of the colorless vessels, is partial; and the part recovers its transparency when the inflammatory action ceases. This is proved by the haziness of the cornea in acute inflammation of the conjunctiva, accompanied by dimness of vision; a symptom which gradually goes off after the inflammation is subdued. When effusion has taken place even in a moderate degree, as in the nebula of the cornea, the opacity is more slowly removed, and seldom perfectly, even long after the inflammation has ceased. Where a deposition has taken place in consequence of a breach of

the natural texture, as after an ulcer of the cornea, the opacity, greater or less according to the extent of the deposition, is permanent. Inflammation is the only cause of cataract open to observation. The simplest example of it is afforded by the accidental wound of the crystalline by a penetrating instrument; in this case the opacity is partial, and the cicatrix of the wound is the centre of the opaque spot. Another frequent example is the cataract following acute inflammation of the choroid and iris, whether arising spontaneously or from injury, as a violent contusion of the eye. In this case the opacity is sometimes diffused over the capsule of the lens which adheres to the contracted pupil; sometimes it is only a central spot, and the iris seems to adhere to a transparent part of the capsule.

A conformation of body favouring a determination of blood to the brain, or frequent exposure of the eye to the stimuli of heat and light in more than ordinary intensity, or the habitual vision of minute objects in a depending position of the head, by which an undue proportion of blood is thrown upon the organ, commonly induce opacity of the crystalline or of the retina; which in one species of amaurosis turns of a green yellow colour, and becomes distinctly visible.

Cataracts are very frequently of spontaneous occurrence in persons of advanced years, in whom no signs of inflammation have preceded the complaint.

Transparent parts obviously tend to become opaque in age, as may be instanced by the want of clearness of complexion in old persons, and the *arcus senilis*, as it is called, which is an opacity without inflammation encroaching upon the cornea. The very minute serous vessels of the crystalline run in the cellular substance which unites the lamellæ. This interstitial texture is probably absorbed in age, and the vessels may be gradually obliterated by compression *; but this must be matter of conjecture.

Cataracts are also formed *in utero*, and I have rarely observed in the subjects of congenital cataract other marks of deranged or defective organization. Some other and more subtle cause of opacity must therefore be admitted.

The cataracts of new-born children and of aged persons exhibit very opposite appearances. In congenital cases the opacity most frequently appears in the central nucleus, the interior denser structure demonstrated in the healthy lens by Petit, and is either stationary, or enlarges equally

* A change in the action of so minute and remote a system of vessels we should not expect to discover otherwise than by its local effects. Changes in other organs, similar to those which produce the different kinds of cataract, are familiar to our ordinary experience. Thus we see the matter of secretions altered, loose interstitial texture consolidated by excess of deposition, or obliterated by absorption; changes, which, in lymphatic glands, and parts framed for less nice and delicate purposes than the organ of vision, are less obvious, although equally subversive of their functions.

and slowly in a circle. This nucleus is sometimes not bigger than a pin's head in the centre of the transparent lens; but more commonly it is of the size of the contracted pupil, so that the child habitually knits his brows, or screens his eyes with his hand, to obtain that state of the pupil which he finds necessary to his vision. The fluid and capsular cataracts are exceptions to this observation. It is well known that adult subjects of cataract see better in moderate than in strong light, but in a much less degree; for the opacity is in them more diffused, so as very faintly, if at all, to exhibit a nucleus; and a dilatation beyond a natural one, I mean that obtained by the belladonna, though it enlarges somewhat the field of light, seldom permits of vision. The opacity commonly appears of equal consistency from the origin of the complaint, and in its progress the light is shut out from the whole sphere of the pupil. The hard cataract affords a partial exception to this remark, in which the nucleus, though imperfectly defined, is generally to be distinguished.

The opacity is sometimes simply capsular, which is known by the uniform nebulous tenuity of the opaque membrane stretched over the transparent lens, and rendered more distinct by the dark tint reflected from the choroides. The cataract appears to be prominent in the pupil, which is sometimes slightly irregular. In this case, which is considered to be an incipient state

of the cataract, as by the consequent opacity or absorption of the lens it becomes more dense and distinct, the quantity of light admitted is considerable.

More frequently the opacity is simply lenticular, which is known by the cataract appearing more dense, voluminous, and varied in its colour and texture, and in relation to the plane of the iris, deeper seated; by the circularity of the pupil, and the greater degree of blindness in the natural state of dilatation. The motions of the pupil being regulated by the quantity of light which is admitted to the retina, its size depends upon the texture and bulk of the opaque lens, i. e. a very dense cataract keeps it dilated by excluding light from the retina; a very bulky one by mechanically distending it. In most cases of congenital cataract, and in some of mature age, the dilatation by belladonna discovers a defined margin to the opacity, and a transparent circle beyond it, and therefore adds considerably to the patient's perception of light. I have known patients in this state, who were of an age to judge for themselves, decline the operation, content with the vision they enjoyed by the use of the belladonna. In such cases, however, a tolerable vision has been previously enjoyed, owing to the smallness of the opaque nucleus compared with the transparent portion of the lens. And in all cases the vision of near objects is confused, if not totally bedimmed, by the enlargement of the pupil with

the belladonna, although that of distant ones is clear and distinct. Where a transparent circumference has been discovered after dilating the pupil by the belladonna, I have never seen the capsule opaque, and I believe this black rim may be considered as diagnostic of the transparency of the capsule. Where the lenticular opacity is diffused, this sign of a transparent capsule is of course wanting.

The opacity is sometimes much deeper seated, so that you look at it through the transparent capsule and lens. It is here generally circumscribed, but irregularly shaped; and often, from its tenuity and depth of situation, escapes the observation even of oculists. This is usually considered to be a third seat of opacity, distinct from the former, viz. in the posterior covering of the lens. I do not find, upon repeated and strict examination, any proper capsule investing the lens, i. e. which admits of being removed with it. It may be necessary to a right understanding of this structure, briefly to describe it. The tunic of the vitreous humour advances to the ciliary body, there it separates into two laminæ, which, when contiguous to the margin of the crystalline, adhere closely to each other, forming the sacculated circle (canal godronné) described by Petit, which is capable of being inflated around the margin of the lens. This canal corresponds in breadth to the breadth of the ciliary processes, and is marked by them ante-

riorly. The anterior lamina, which is the more dense of the two, covers the crystalline in front; the posterior lines the fossula of the vitreous humour. There is no communication betwixt the canal of Petit, the vitreous humour, and the crystalline capsule. They are all distinct from each other, and must be inflated distinctly, if perfect. The crystalline, it will appear from this description, is incased in a duplicature of the vitreous capsule. The different texture of these laminæ adapted to their respective uses, (the one properly belonging to the crystalline, and supporting the whole lens in its place; the other proper to the vitreous, and covering a very small portion of the humour, which is sufficiently supported by the crystalline itself) and likewise the close investiture of the margin of the lens, which interrupts continuity, for it prevents the passage of air, explain why they are so seldom similarly affected in disease. The posterior opacity before described is therefore seated in the proper tunic of the vitreous humour. Thus much on the situations of the opacity forming cataract.

The varieties of consistency, color, and figure, are numerous. With regard to consistency, we have the fluid or milky, the flocculent or fleecy, the caseous or doughy, and the compact or hard cataract. The fluid lens is, I believe, rarely contained in a transparent capsule. The latter, in my experience, has been partially opaque, present-

ing a dotted or mottled surface. The capsule appears in contiguity with the margin of the pupil, and as if projecting in it, and the opaque spots upon it are most distinguishable when it is viewed laterally. The second usually resembles, in appearance, flakes of snow irregularly heaped, being visibly of a loose and broken texture, and the larger masses intersected by semi-transparent lines: the arrangement is sometimes regular and uniform, being either foliated or radiated. The capsule is sometimes semi-opaque, but more frequently transparent. The third is the cataract of greatest bulk, impeding the motions of the pupil, having a heavy and dense appearance, uniformly opaque, a clouded not a fleecy whiteness, and sometimes a greenish or dirty white tinge. The fourth appears deep seated, of a brown yellow, or amber colour, most dense in the centre; if entirely opaque, flat upon the surface, over which the iris plays freely. The second and third species are most commonly met with; the first and fourth are comparatively rare.

The description of such appearances is difficult, and might appear over minute; but to an eye much accustomed they admit of ready distinction, and the distinction is of the highest importance, as the operation should be selected accordingly. To the first and second species, formerly regarded as incurable on account of their softness, the operation performed by the late Mr. Saunders is admira-

bly adapted. To the two latter, the operation of couching or extraction is best suited.

In the description given the capsular opacity is not included; for when the capsule is completely opaque, we can hardly judge of the texture of the lens. But where the complete opacity of the capsule exists, the lens is commonly diminished in bulk; it undergoes a waste after the opacity of the capsule, so as in process of time to become a membranous cataract. This I conceive to be owing to the obliteration of the vessels of the capsule, from which those of the lens are derived. When the capsular opacity is congenital, it is either purely capsular, or only a very small piece of lens remains. When the capsule turns opaque from injury, the lens is soon greatly reduced in bulk, as appears from the falling in or concavity of the iris which loses its support, and is demonstrated in the operation. This observation renders the operation with the needle appropriate to the cataract in which the capsule is opaque, in cases which are not very recent. When the capsule of the vitreous humour is the seat of the opacity, I have not observed that the lens undergoes any diminution, nor have I yet ascertained the remediableness of this case. The membranous or purely capsular cataract is a form of the disease which appears to me to require a somewhat different operation.

The fluid cataract commonly requires only the

central aperture of the capsule; it flows out into the anterior chamber, and mixes with the aqueous humour, which, by the absorption of the opaque particles, in a few days recovers its transparency. It is to be observed, however, that this form of cataract requires to be treated with caution. I have seen two instances in which the simple discharge of the fluid was followed by severe inflammation, by which the process of absorption was arrested, as appeared from the permanently turbid state of the humour. This does not happen where the whole substance of the lens is changed. The milk-like fluid in these cases concealed a solid bed of lens, which, by the free laceration of the capsule, was set at liberty, and oppressed the iris.

The flocculent cataract readily undergoes solution in the aqueous humour, when the capsule is freely opened, and its texture broken down by the needle *.

* The attempt to procure a solution of the opaque crystalline in the aqueous humour, was suggested by an accident, in which the crystalline being wounded, became opaque, and was removed by this process. I have seen many examples of the same fact. Among the miracles recorded to have been wrought at the tomb of the Abbé Paris, is the gradual restoration of sight to a young man who became blind after a puncture of the eye with an awl, which caused the discharge of the aqueous humour. (See Paley's Evidences of Christianity, vol. I. p. 380.) This miracle admits of a more satisfactory explanation than has yet been offered, as the familiar case of a cataract formed by the wound, and undergoing absorption.

While any portion of the capsule preserves its connection, it continues to be nourished, and of course, resists absorption; but an insulated portion of capsule is dissolved and absorbed, like any other matter extraneous to the circulation. These facts are ascertained by the aperture in the capsule remaining ever after unchanged in dimension, and if it be equal to the natural aperture of the iris, so that its broken margin cannot be seen in the pupil, it will always appear upon dilating the pupil with the belladonna. If the aperture be made of a given size and figure, as for example, the figure of a small diamond, in the centre of the capsule, it will ever after retain its figure and dimensions. But where the aperture is ultimately of the full size of the pupil, it is evident that the portion of capsule that has disappeared, must have undergone solution and absorption with the lens. The transparent capsule is tense and contractile as well as delicate in texture, so that a wound made in it is enlarged by the retraction of its sides; but the retraction without loss of substance would be very insufficient to account for the magnitude of the aperture, and we continually see that a mere puncture or cut of the transparent capsule, from accidents with pins and scissars, unites by adhesion, forming an opacity. In the opaque capsule, which has no contractility, it is still more decidedly proved, that the aperture of the size of the pupil must be produced by the laceration of the capsule in fragments, and

the absorption of these fragments together with those of the lens.

The reasons why the operation of Mr. Saunders is objectionable in the two latter species of cataract are, first, the degree of force required to break down these cataracts with the needle, sufficiently to undergo a quick solution in the aqueous fluid; and secondly, the danger of dislocating the lens in the attempt. If the operation upon a cataract of firm consistence is conducted with the caution which experience dictates, the process of solution is tediously slow, and the operation must be repeated many times; but this is the least evil. If the operator, after having opened the capsule in the centre, acts with the same freedom as upon the soft species of cataract, the unsupported lens falls forward, or revolves and turns edge foremost in the pupil, so as to put the iris on the stretch; or it passes entire into the anterior chamber. If he succeed in dividing it, large and solid masses will press upon the iris, wedge in the pupil, or pass into the anterior chamber, and the consequences be the same in kind though less in degree. Even where the operation is confined to the aperture of the capsule, and the lens has been scarcely touched, I have known the eye destroyed by the accidental falling of the lens through the aperture and pupil into the anterior chamber; a slow inflammation of the iris ensues, which not only produces the most distressing symptoms, but

admits of little, if any alleviation, until the mechanical pressure is taken off. This event, so much to be desired, is unfortunately protracted, for the process of solution is arrested by an adventitious coating of lymph, which is effused by the inflamed vessels, and invests the extraneous body. This lymph becomes partially organized, and the case terminates in obliteration of the pupil and anterior chamber, or by the sympathy of the retina with the suffering iris and choroid, in incurable amaurosis. Having more than once observed the protrusion of the lens, and the consequent inflammation of the iris to ensue, where I had studiously endeavoured to prevent it, I was led to suppose this might be owing to the previous dilatation of the pupil by belladonna, by which the lens was deprived of support. I therefore omitted the previous use of the belladonna where the cataract was substantial and firm. It was then applied to the eyebrow an hour or two after the operation, with a view of preventing the adhesion of the pupil to the capsule of the lens; but under the influence of the belladonna, I repeatedly observed, that the unsupported lens came forward, and the symptoms of pressure commenced. I therefore deferred its employment until a time sufficient had elapsed for the renewal of the aqueous humour, which, I conceived, might resist the pressure of the lens. By this precaution the accident was effectually prevented, no symptom of inflammation followed, and the advantage of keeping the pupil circular was equally obtained.

It may be right to observe here that when the belladonna is used with this view, the interval of its application should be sufficient to admit of the recovery of the pupil, or it will be permanently dilated. With every precaution, however, the operation with the needle upon the full and firm cataract, is either distressingly tedious, or what is more to be objected, destructive to the organ, and very trying to the health and spirits of the patient. In such cases I have, therefore, relinquished the operation, which was very ingeniously conceived, and for its simplicity appeared to me to deserve a full and fair trial of its merits. It is due to the projector of the operation to state, that its superiority was distinctly asserted by him only in the cases of soft and capsular cataract, as may be seen by a reference to his essay on that subject, in his posthumous work edited by Dr. Farre. At page 173 of the volume referred to, the editor observes, "In the adult, if the texture of the lens is nearly uniform and permeable, the cure is completed in a space of from three to five months; but if the texture is firmer and the nucleus large, the cure cannot be accomplished in less than seven months. On this account the author, who thought highly of extraction, and performed this operation with dexterity and success, was inclined to extract the lens when its texture was unusually hard. The editor cannot assert that he would ultimately have conceded thus much in favour of extraction. It was intended that such decision should result from

a very long and impartial trial of both operations. With respect to thesofter lens, or the capsular cataract, he was satisfied of the superiority of his operation."

In performing this operation for the soft cataract the operator may pass his needle through the cornea or the sclerotic. The former mode commands the advantage of giving no pain, exciting but slight inflammation, and ensures the laceration of the transparent capsule, which is sometimes so elastic that the operator,whose eye is not well accustomed, is in danger of not opening it in the centre, or of wounding the interior surface of the cornea. This is especially to be feared in operating behind the iris, when the lens is, at the same time, much diminished by absorption, as in children; so that the capsule moves before the needle instead of resisting it. Few cases of lenticular cataract occur, to which this method is appropriate, and in which it is adviseable to perform the posterior operation. There is more pain, more inflammation, more danger of displacing the lens than in the operation through the cornea. But when the capsule is opaque and the lens diminished in bulk, either spontaneously or in consequence of former operations, so as to have receded from the pupil, the posterior operation is more eligible, as the operator readily ascertains the effect of the needle upon the capsule, and directs its movements to the best advantage; while the inflammation is always

moderate in proportion as the lens is small. Indeed in the purely capsular cataract of the adult, and the half absorbed cataract of children, it is so slight as scarcely to confine the patient. When a cataract of firm consistence has undergone a partial absorption from one or more operations with the needle, and still does not readily separate into fragments, the introduction of the needle, posterior to the iris, gives the surgeon the advantage of couching it. This I have often done to the great satisfaction of the patient, who escapes, owing to the diminished bulk of the lens, the inflammation which occasionally follows the primary operation of couching. It was my intention to point out the circumstances which should determine the election of couching or extraction in the two latter species of cataract, and to shew the value of these operations relatively to each other and to that by solution, as the deliberate result of an impartial investigation of all. This I shall make the subject of a future communication.

I have annexed a plate, representing the appearances of the several species of cataract described. Varieties may be referred to one or other of these as a standard. If the operation proper to the case be selected, each will maintain its credit, as neither of them is applicable to all cases. I believe, upon inquiry, it will be found that the exclusive preference given by operators to one method, and consequently, the frequent mal-appropriation of the remedy to the case, has proved the most common cause of failure in the treatment of this disease.

CASE

OF

CONTRACTED WRIST,

SUCCESSFULLY TREATED

BY MR. HODGSON,

SURGEON OF LEWES.

COMMUNICATED BY

SIR EVERARD HOME, BART.

SERGEANT-SURGEON TO THE KING, AND SURGEON TO ST. GEORGE'S HOSPITAL.

Read Jan. 19, 1813.

WHEN I was first requested to see the patient, whose case I am about to relate, a young lady, about twenty years of age, it was not from any expectation on the part either of her or her friends, that a cure could be accomplished; but happening to be at her father's house, I was asked if I should like to see her hand, for it was kept wrapt up in a napkin on account of its unsightly appearance. Upon examination, I found it in the following state: the carpal bones were so completely dislocated, that their posterior part with the ends of the radius and ulna represented the anterior part of a stump: the fingers were strongly clenched into

the palm of the hand, with the knuckles resting upon the inside of the fore-arm, opposite the flexor tendons. Upon enquiry how this happened, I was informed it was in consequence of convulsion fits: whether the parts were thus disunited by the strong action of the flexor muscles during an hysteric paroxysm, or in consequence of a person inadvertently aiding that action by pressing on the back of the hand at the time, appeared immaterial; and, upon reflecting that this derangement of parts had not been accompanied by any morbid process, I gave it as my opinion that they might be restored to their former state, and the young lady was accordingly placed under my care for that purpose. I commenced the process in the following manner: —Having immersed the hand in warm water, I succeeded in getting the little finger sufficiently out to admit of a small bolster of wool wrapped in linen, being placed within its grasp, in which situation it was left—this plan was pursued daily, the fingers being taken in succession, and the bolsters gradually increased in size—while, at the same time, I endeavoured to bring the hand back; but the rigidity of the wrist was so great, that had not my patient possessed an uncommon share of courage, she must have been disheartened from any farther attempt. By the use, however, of warm water, and embrocating the parts with oil, it gradually gave way, in the course of about ten weeks, to a moderate degree of force applied by my hand daily. During this process, till the carpal bones

were replaced in the scaphoid cavity, it was extremely difficult to maintain the ground we had gained from time to time, in consequence of the bolsters, though aided by bandages, being insufficient to prevent the flexor muscles from drawing the hand down into the situation which I have described. Under these circumstances, the utmost advantage was derived from an apparatus which I contrived for the purpose, and which consisted of a spring made of iron, which projected from the back part of the wrist over the back of the hand. To this a piece of soft leather, passed round the inside of the fingers and palm of the hand, was fixed. By these means the hand was effectually kept in its situation. When the carpal bones were replaced, they were supported by means of a common splint passing along the outside of the arm from the elbow to the ends of the fingers, and another of the same length along the inside—these were continued for some time, and then laid aside; since which time, now upwards of three years, the hand has continued perfectly well.

HISTORY AND DISSECTION

OF

A FATAL CASE

OF

CYNANCHE LARYNGEA.

By EDWARD PERCIVAL, M.D.

PHYSICIAN TO THE HOUSE OF INDUSTRY, DUBLIN.

Read June 8, 1813.

THE following recital of a case of cynanche laryngea, whose fatal event has lately deprived the world of an eminent character, is transcribed from notes taken daily during my personal attendance upon him, in conjunction with another physician, and two surgeons.

X. Y. aged 63, of spare, though muscular habit, and somewhat delicate health, was attacked with apparently slight catarrh and sore throat, in consequence of a hasty and fatiguing journey. On Tuesday, May the 4th, 1813, he consulted an eminent physician of this city, who advised purgative and sudorific remedies, under which treatment the symptoms appeared wholly to subside.

Having imprudently ridden out, and exposed himself to a cold east wind, the catarrhal affection recurred on Friday the 7th, when he was directed to be bled to the amount of 16 ounces, to take a pill of calomel and cathartic extract, and a draught with nitre. He rested perfectly well this night, and appeared nearly in his usual health on the following morning. His tongue was clean, his pulse between 70 and 80 strokes in the minute; and he took an airing in his carriage in the course ofthe day. On the following morning (Monday) he again manifested catarrhal symptoms, with sore throat, and hoarseness. He was now directed to take James's powder to some extent, which induced profuse perspiration, with great relief of all the urgent symptoms. Before the sweating had subsided, on Tuesday morning, he injudiciously rose from his bed, and occupied himself during the day, by dictating aloud to some attornies in his chamber. In the evening, his respiration became much impeded, and his voice extremely hoarse; which alarmed him by the resemblance of the present attack, to one which he had experienced in London, eleven years before. On that occasion, he was bled copiously and repeatedly, and narrowly preserved his life. The patient himself, and several of his friends, affirmed the disorder to be the same as the present, and confined to the upper parts of the windpipe. It may be proper to observe, that his father suffered a severe attack of this kind many years ago.

On Wednesday morning, I saw him for the first time, in conjunction with another physician and a surgeon. His countenance was then pale and anxious; his eyes protruding; his tongue foul and much swelled; his respiration slow and laborious, with a shrill or stridulous sound, as of air forcibly passing through a narrow orifice; and his voice indistinctly audible, in the tone of a hoarse whisper. He had a perpetual inclination to expectorate; but all his efforts to this purpose were fruitless, which added much to his distress, by the continual apprehension of suffocation. He was perfectly unable to swallow any substance, whether fluid or solid, as the smallest portions of either were instantly rejected with violent coughing. The visible internal fauces were of natural appearance and pale colour. He informed us that he had experienced some shooting pains about the larynx, which were now entirely subsided. The epiglottis was swollen or distended, and somewhat erect; which accounted for the coughing and sense of suffocation on attempting to swallow anything, as this organ had ceased to act as a valve upon the larynx. His pulse was full, throbbing, and very frequent.

Twenty ounces of blood were withdrawn from his arm by a large orifice, which afforded some immediate relief to his respiration, and his general feelings of distress. He now thought he was able to swallow, but on attempting it with a tea-

spoonful of water, the fluid was rejected with a fit of coughing, or rather of suffocation, which nearly extinguished life.

Sixteen leeches were now applied to his throat, and two purgative enemata were administered, which brought away no fæces.

In the afternoon, his urgent symptoms appearing to be stationary, twelve ounces of blood were taken from his arm, and a dozen leeches applied to his throat.

At 9 o'clock p. m. his pulse was softer and less frequent; but his tongue was still swelled and dry, his breathing not amended, and the stridulous sound unabated.—Bronchotomy was now determined upon; and the operation was performed without delay, by a vertical division of the integuments covering the interval between the cricoid and thyroid cartilages; the tracheal membrane was pierced laterally, and a canula was inserted, whose diameter was somewhat less than half an inch. The loss of blood by this operation might be about six ounces; some part of which escaped into the trachea, and was returned through the aperture with much gurgling noise. He likewise expectorated a small quantity of mucus. In about half an hour, he breathed with perfect facility, and fully inflated his lungs, which was hailed as a favorable circumstance. He slept at intervals dur-

ing the night, for the space of three hours; and towards the morning, he swallowed four dessert spoonfuls of milk, with some caution and address.

At half past ten o'clock A. M. (Thursday) his pulse was frequent but tranquil, his animal spirits lively, and he wrote much with a pencil upon paper, concerning various matters. He spoke with effort, and the tone of his voice was still that of a hoarse whisper. Two or three purgative injections brought away a trifling quantity of fæcal matter. At noon, he made a fruitless attempt to swallow. A nutritive injection of milk, and another of broth, were administered in the course of the afternoon and evening. Eight leeches also were applied to his throat. During the night, his pulse became more frequent, and he continued, though restless, to lie on his back only when recumbent. By great, and repeated efforts, he expectorated a piece of hardened mucus besmeared with blood. About two o'clock in the morning, his breathing became greatly embarrassed, his extremities grew cold, and he appeared to be on the point of death. Twelve ounces of blood were withdrawn from his arm; the canula was cleansed and replaced (an operation which was always repeated at short intervals) when to the agreeable surprise of his attendants, his respiration became more easy, the warmth returned to his extremities, his pulse revived, and shortly afterwards his animal spirits and cheerfulness returned. He swallowed a

pint of liquid nourishment, at intervals, with tolerable facility; and he repeatedly expectorated pieces of hardened mucus, besmeared with blood.

At 10 o'clock A. M. on this day (Friday) he appeared refreshed and amended in all respects. Purgative and nutritive enemata were administered during the day alternately. He swallowed also small portions of broth and jelly repeatedly. In the evening, his pulse was soft and tranquil, though still frequent. His supine posture was, for the first time, changed to lying on his right side. His powers of deglutition were considerably improved, and the tone of his voice greatly amended. He had passed fæces and urine. His tongue, which had hitherto been swollen and hard, was now reduced to little more than the natural size, and was soft and moist; his countenance also was much improved; but he continued to breathe only through the canula.—He passed the early part of this night tranquilly, until 2 or 3 o'clock in the morning, when his fever increased (similarly to the exacerbation of the preceding night), his breathing became laborious, and he evinced much irritability and despondency of mind. This febrile paroxysm continued for several hours.

At noon on Saturday, his symptoms again wore a favorable appearance. His countenance was natural; his pulse, though frequent, was regular and

firm; his tongue was reduced to its natural size and appearance; his powers of deglutition were perfectly restored; and the tone of his voice approached to a low key of the natural sound. He had passed copious evacuations, by a solution of Rochelle-salt in chicken-broth. The canula had been removed from the trachea for some hours; and as he breathed with perfect facility through the natural organs, it was not afterwards inserted into the aperture.

The evening, and early part of this night, were passed with tranquillity and some sleep. About sunrise, however, he began to shew much impatience, irritability and alarm. Yet he swallowed, at 6 o'clock A. M. on Sunday morning, six or seven spoonfuls of oatmeal porridge, with milk, at his own particular request. About two hours afterwards, his mind appeared to be much disturbed; his pulse became more frequent and feeble; delirium, and at length stupor supervened, and he sunk rapidly until 6 o'clock in the afternoon, when he died without a struggle.

At 3 o'clock on the following day, one of the surgeons who had been in attendance, (and who is a skilful professor of anatomy in this city) opened the thorax and examined the larynx in my presence. The following is an account of the appearances dictated at the time of the dissection.

On opening the thorax, the cartilages of the ribs proved to be ossified. The left side of the mediastinum, and the surface of the lung contiguous to it, appeared quite dry, as though the parts had been long exposed to air. A similar appearance, though in a less remarkable degree, manifested itself on the right side. The lungs were perfectly sound and natural, excepting a slight adhesion of the right lung to the costal pleura. Somewhat more than half an ounce of aqua pericardii was discovered; the heart itself was perfectly natural.

The membrane common to the larynx and œsophagus, was very much thickened. The epiglottis was perfectly natural; but from the sides of this, to the arytenoid cartilages, the parts were morbidly thickened, increasing in density, as they approached the cricoid cartilage. The orifice of the rima glottidis was somewhat diminished, but exhibited no appearances of unusual vascularity. On dividing the membranes in the posterior part of the trachea, its internal surface appeared coated with thin pus, which continued to shew itself to the base of the cricoid cartilage, and between the membrane common to the œsophagus and larynx, and the posterior surface of the cricoid cartilage. Passing a probe into this part, it was discovered that between this membrane and the muscles of the larynx, even to the

points of the arytenoid cartilages, was formed one extensive abscess.

The upper edge of the cricoid cartilage was ossified, and found bare and rough by loss of surface as from exfoliation. The right arytenoid cartilage was dislocated, and when moved on the cricoid, gave the sensation of two bones, stripped of their articulating cartilage, rubbing together.

Tracing the course of the abscess just mentioned, along the right side of the larynx, it was found to extend between the cricoid and thyroid cartilages, until it reached nearly to the edge of the artificial opening made during life, without however communicating with it in any part.

Remarks.—On reviewing the history of the preceding case, the first circumstance of remark is the unexpected suddenness and violence of the morbid affection of the larynx; an affection which has been so ably and discriminately defined by Dr. Farre, in his valuable communications to the Society, that I shall not here enlarge on its diagnostic character.

In the foregoing case, during the course of twelve hours from the first attack (on Tuesday evening) the disease was fully formed. The swelling and erection of the epiglottis; the slow, difficult, and stridulous respiration; without any pain

or oppression of the lungs, or the slightest erubescence of the visible internal fauces; the exasperated pulse, and perfect inability of deglutition, marked the disease as cynanche laryngea.

The copious depletion of blood, already detailed, to the amount of 66 ounces, (which was uniformly buffed and closely cupped) together with the extravasation of 36 leeches, reduced the general fever, without affording any corresponding local relief. It was, at that juncture, a question whether bronchotomy should be resorted to; and the measure was decided upon, from a consideration of the age and delicate constitution of the patient; and from a persuasion, that time only could reduce the inflammatory tumefaction of the diseased parts. Meanwhile it became essential to facilitate the function of respiration; and to relieve the bowels, and supply nutriment by the rectum. But the nocturnal exacerbations of fever, (unattended however by any observable rigors) greatly discouraged the hope of final relief.

On dissection, these phænomena appeared to be accounted for, by the abscess established, and the continual formation of fresh purulent matter.

It was very evident, both from the symptoms during life, and from the appearances on dissection, that the inflammatory stage of the disorder had entirely subsided some time previous to the dissolu-

tion of the patient. So entirely, in truth, had the urgent symptoms ceased, that, 24 hours before his death, his medical attendants had formed better hopes of the event of his disorder, than they had ventured to indulge at any preceding period. Respiration and deglutition were restored to their natural facility; the fever, though not subdued, had considerably abated; and the animal spirits, and countenance of the patient, were such as to encourage the hope of ultimate recovery. In the course of the following night and morning, the febrile exacerbation recurred with more violence and more alarming symptoms than ever; delirium, stupor, and at length death supervened, by the process common to febrile exhaustion.

I have already stated, that the patient had a severe attack of a similar, and not improbably of the same disorder, eleven years ago. Sir Gilbert Blane has obligingly informed me, that "he was called to a medical attendance on the subject of this case, in London, in Feb. 1802, when the patient, after labouring under catarrh for ten days, was seized with fits of strangulation, which continued, at intervals, for a week, during which period he was thrice bled. The blood was buffy, but not cupped, on the two first occasions; on the third, the buff was absent, and the complaint then assumed a form, so purely spasmodic, that opium and assafœtida were given with evident relief." I have since been informed, that twenty years ago,

whilst he was on a journey in Ireland, he was similarly affected, in so severe a degree, that medical aid was summoned from Dublin on the occasion; and that a long time elapsed before he recovered from the severity of the disorder.

On the late occasion, the unfortunate resolution which he took, of rising from his bed during profuse perspiration (excited by doses of James's Powder) and of occupying many hours in dictating aloud, conspired at once to expose him to a chill over the surface of his body, and to excite preternatural irritation in the larynx. The predisposition to the specific disorder of cynanche laryngea was not only hereditary, but clearly marked in the individual constitution.

From the foregoing recital, I think, may be inferred the expediency of resorting early to the operation of bronchotomy, before the lungs are thrown into a disordered condition; and before the general powers of life are exhausted by the laborious and imperfect exertion of this vital organ. Had not the secret abscess been formed, in the case before us, the general fever would, in all probability, have subsided with the decline of the local inflammation; whilst the intervening restoration of the powers of breathing and deglutition might have been effectual in preserving the life of the patient.

Dublin, May 18, 1813.

HISTORY

OF A

DISEASED METACARPAL BONE;

REMOVED BY AN OPERATION,

WITH

THE DESCRIPTION OF AN INSTRUMENT FOR SAWING OFF THE EXTREMITIES OR PORTIONS OF THE LONG BONES.

By JAMES WARDROP, F.R.S. Edin.

Read June 22, 1813.

THE number of limbs which have been saved by the removal of portions of diseased bones and articulations is extremely small; and, if we except the list of cases so carefully collected and detailed by Dr. Jeffray*, I believe there are but few to be met with in the annals of modern surgery. The severity and difficulty of such operations, the uncertainty of their success, and above all the little advantage which the patient can receive from the limb which is saved, will probably prevent operations of

* Cases of the excision of carious joints, by James Jeffray, M.D. Professor of Anatomy and Surgery in the College of Glasgow.

this kind from being ever generally adopted. These remarks apply more particularly to the lower extremities and the larger joints; for the removal of the head of the humerus and of portions of bones in other parts of the body, has been attended with such great advantages as have brought the practice into general use. It is not the object, on the present occasion, to enter into a detail of these and similar cases, my intention now being merely to state the effects of removing a considerable portion of one of the metacarpal bones, to point out an easy mode of performing such an operation, and to mention the probable advantages which may reasonably be expected to arise from similar operations.

The patient, on whom I performed the operation, was a young woman, about twenty-four years of age. The disease was in the left hand, and the caries affected the metacarpal bone which supports the middle finger. There was a fistulous opening in the integuments, corresponding with the middle of the bone, which allowed a common probe to pass readily through it, and which led directly to a bare and rough bone; but the rough portion was not extensive. The integuments at this part were slightly swelled, and destroyed the natural angular appearances on the back of the hand. They were also red and inflamed, tender to the touch, and had a peculiar puckered appearance round the fistulous opening. The motion of this finger was attended with a good deal of pain,

and that of all the fingers was so impaired, that she could not use the hand. The disease had originated two years before, in consequence of having received a severe blow on the part affected. The blow gave her acute pain; and soon after a tumour formed on the part, which was considered as a common ganglion. Some months afterwards a charlatan told her that she must either lose her hand, or have the tumour destroyed with caustics; she consented to the latter. He applied a white powder over the tumour, which gave her most excruciating pain for twenty-four hours; and, in eight days, considerable portions of the soft parts separated, and left the bone underneath bare. Caustics of the same kind were three times successively applied, each time producing great agony. After returning home, the wound formed by the caustic healed to a small point, and she was for some time after enabled to use her finger, and to sew a little. The pain, however, and inability to move her finger again returned, and continued until the time of the operation.

As it was thought probable that there might be a considerable risk of the disease extending to the contiguous parts, and that if even an exfoliation of the diseased portion of bone took place, such a process would be extremely tedious, it occurred to me that not only the finger, but even the hand, might be saved by removing the metacarpal bone alone. An operation of this kind presented

considerable difficulties. It would have been almost impracticable to have attempted taking out this bone at its articulation with the carpal bones; and it appeared, on first consideration, equally difficult to saw through the bone immediately below its head; as from the close connection of the metacarpal bone on each side, there would be no room for any of the common saws to work. Besides, there would be a considerable danger of wounding the soft parts of the palm of the hand underneath the bone, as the deep palmar arch of arteries lies close to, and runs across this part of the hand; and the difficulty of tying those arteries from a narrow unyielding wound, situated between two bones, can easily be foreseen by those who have witnessed wounds of any of these vessels. From these considerations I was led to perform the operation in the following manner.

An incision was made through the integuments from the extremity of the affected metacarpal bone which is articulated with the carpus, extending to its articulation with the finger. The extensor tendon was dissected to one side, and the surface of the bone cleared of the subjacent soft parts, which were considerably thickened. In order to saw through the bone, which I intended to do close to its upper extremity, I employed the following instrument. See *Plate* I. *fig.* 3. The head of a common trephine was chosen of a diameter a little greater than the

breadth of the bone, and less than the space formed between the two contiguous bones; two-thirds of its head were completely cut away, so that the remaining third formed a saw, which when the center-pin was fixed in the middle of the bone, could cut it through in almost a straight line. With this instrument I divided the bone readily, a little difficulty being at first met with in determining the precise point for the center-pin, as the parts contiguous to the bone were thickened; and also, it was necessary to guess accurately when the division of the bone was completed; for, if the saw had been carried deeper, much mischief might have arisen from the division of some of the subjacent arteries. When the bone appeared to be sawn nearly through, it was readily removed by dissecting out the articulating extremity from its connection with the finger, and by a levator raising it out, and separating it from the soft parts. No vessel was divided during this operation which required to be tied with a ligature, so that nothing further was necessary than bringing the lips of the wound together with adhesive plaster*.

The wound filled up rapidly with granulations, and in fifteen days it was completely healed, ex-

* Fig. 4. Plate I. represents the portion of bone which was removed, (*a*) is the hole made by the center-pin, (*b*) is the carious portion of the bone, and (*c*) is the extremity with which the finger was articulated.

cept a small spot which was always observed to be covered with a yellow-coloured crust. At this part a fistulous opening was formed, through which some small spiculæ of bone were afterwards discharged. In a few months after the operation, the finger had regained such strength as to enable her to sew, and such a degree of motion as to be bent to nearly a right angle with the hand. There was, however, a very considerable diminution in its length, for as the cavity from which the bone had been removed, was filled up with a soft yielding substance, it afforded neither any resistance nor firm support to the action of the flexor and extensor muscles.

Upwards of two years after the operation was performed, I saw the patient. This finger was so much shortened, that instead of being longer than those contiguous, as is the case in the natural hand, it was at least one-fourth of an inch shorter. The fistulous opening had always continued to discharge from time to time a serous fluid, and the cavity from which the diseased portion of bone was taken, continued to be filled up merely with a soft elastic mass.

It may therefore be supposed that the motion and firmness of support of the finger must be extremely limited, and that though this operation succeeded in preserving the finger, yet the member was of little use for any of the common purposes

of life. It ought however to be mentioned, that this young woman some months after the operation suffered severely from pectoral complaints, and her constitution was afterwards so much weakened, that it is extremely probable the healing and consolidation of the wound were greatly interrupted. It therefore appears to me, that though the effect of the operation in this case was not so advantageous to the patient as might at one period have been expected, yet the result was such as to warrant a similar mode of operating where the disease is limited to one of the metacarpal or metatarsal bones.

Cases of this kind no doubt rarely occur, but occasionally instances of caries and exostosis are met with in these bones, by the removal of which not only one finger, but the whole hand might be preserved.

When such an operation becomes necessary, the saw which has been described will be found completely to fulfil every purpose for which it was intended, and I think it very probable that an instrument constructed on a similar principle, might be well adapted to saw off the heads of the larger bones, or to remove a cylindrical portion of a long bone.

CASE

OF A

DOUBLE ENCYSTED TUMOUR,

THE POSTERIOR CYST OF WHICH, SITUATED DEEPLY BETWEEN THE EYE-BALL, AND THE FLOOR OF THE ORBIT, WAS ATTACHED TO, AND PARTLY CONTAINED A TOOTH;

By Mr. S. BARNES,

SURGEON TO THE DEVON AND EXETER HOSPITAL, AND TO THE EYE INFIRMARY, EXETER.

COMMUNICATED BY

BENJAMIN TRAVERS, Esq.

Read April 27, 1813.

IN November, 1812, Thomas Heard a healthy looking young man of 17, was admitted an in-patient of the infirmary, for the cure of diseases of the eye, in this city, on account of a tumour which completely obstructed the sight of his left eye.

The tumour was situated beneath the eye, occupying a very considerable portion of the orbit; the eye in consequence being pushed into the upper part of that cavity, so as to be almost wholly hidden behind the upper lid. On tracing it backwards, it appeared to extend to a very considerable depth;

and it projected so much in front, as to constitute a very striking deformity. The anterior part of the tumour was rounded in form. A superficial groove running obliquely across its upper surface, formed a slight line of division between the more prominent and moveable part of the swelling, and that more immediately under the eyeball. The ciliary edge of the lower tarsus, with a few scattered hairs in it, crossed the front of the tumour rather above its middle; the conjunctiva, drawn forwards from the eyeball, greatly stretched, but not apparently much altered in structure, investing it above; and a thin skin of a deep red, loaded with purple vessels covering it below; but neither of them closely adherent to it. The portion of the tumour in front, was soft, and could be moulded into different shapes by the fingers: the posterior division felt more elastic.

By an effort, he could raise the upper lid a little, but not high enough to discover even the lower edge of the cornea. By lifting it with the finger, a portion of the pupil might be exposed, and he then could distinguish objects partially. The eye was apparently perfect, but he had scarcely any power of moving it to different points.

The swelling was first observed in early infancy, and was at that time not much larger than a pea. It increased but slowly, until about four or five years since, when it began evidently to enlarge, and

for some time it grew rapidly. Latterly it had not advanced much.

It caused no pain, but as it was a great deformity, was still enlarging, and the eye sound, though rendered useless by its presence, it was thought advisable to remove it.

In the operation, a division was made of the inferior oblique muscle of the eye, which appeared stretched across the front of the tumour, having been pushed before it in its progress from the deeper parts of the orbit. The sac adhered firmly to the outer angle, and part of the lower edge of the orbit: in most other points it was but loosely connected with the surrounding parts. It was found to extend almost to the bottom of the orbit, and to occupy more of it than the eye did itself: and it not being possible to proceed in the dissection far within that cavity, without greatly endangering the eye, on account of the very narrow space between it and the posterior division of the swelling, the contents of the latter were partially evacuated to obtain room; and the sac cautiously separated from its deeper attachments. Towards the posterior point, on the inner side, and more than an inch from the edge of the orbit, the sac felt as if it embraced a sharp bony process, arising from about the line of junction between the ethmoid and superior maxillary bones. Unwilling to proceed at hazard, the sac was cut off close up to this pro-

jection, that its nature and connections might be examined before an attempt was made to remove it. It appeared to be formed of bone, terminating in a sharp point, and projecting nearly in a perpendicular direction into the cavity of the orbit. It was slightly moveable, as if attached to the periosteum only; and was removed without much difficulty, together with the remains of the sac which adhered to it.

On examination, it was found to be in structure a tooth; and much resembling in form and size, the supernumerary teeth sometimes found in the palate. The part which projected into the sac was conical, and covered by smooth, shining, white enamel: the sac firmly adherent round a contracted portion at the base of the cone, resembling the neck of a tooth; and without the sac, the appearance of a root, truncated obliquely, with a passage in the centre, evidently containing blood-vessels. It was by this part that it was connected with the floor of the orbit.

The tumour was found to be made up of two cysts, separable at the groove before mentioned, to some depth all round, by dissection, but united indissolubly in the centre. That in front allowed the colour of its contents to be distinguished through it. The posterior sac was thicker and more vascular. The interior surface of that in front was rough, with here and there a chalky matter ad-

hering to it. It contained a compact lardaceous yellow substance. The inner surface of the posterior sac was smooth, excepting a part near the tooth, where it had much the appearance of coarse skin with many pores in it. The contents were partly a whey-coloured fluid, and partly a yellow curdy substance*.

The eye did not in the least drop on the removal of the tumour; and the large cavity which had been produced by it, was filled with some pieces of soft sponge, dipped in oil. On removing the last piece of sponge, on the seventh day after the operation, the cavity was found to be every where covered by healthy granulations. The opening contracted rapidly, and the eye sunk fast, so that within a fortnight it became nearly on a level with the other.

He was discharged in the beginning of January, with the wound perfectly healed. The lower lid did not, at that time, cover so much of the eyeball as it does naturally; and in one spot the ciliary edge was a little inverted. He had the

* The cyst and the point of its attachment are represented in fig. 1 & 2. of plate 1.

Fig. 1. The tumour of its natural size; the posterior cyst brought forward to shew the situation of the tooth. A. The posterior cyst. B. The anterior cyst. C. The tooth.

Fig. 2. The orbit. A. The point near which the tooth was attached.

power of moving it slightly, but he could not raise it high enough to bring it into accurate apposition with the upper. The lacrymal ducts of both lids were pervious to fluids, which passed freely into the nose by means of a syringe. There was a considerable hollow above the eyeball; and the eye was not quite in a line with the other, but rather above it. He could not move it at all downwards, or freely in any direction. With the exception of this inconvenience, he enjoyed in it perfect vision.

He had a complete natural set of teeth, though many of them were disposed irregularly.

TWO CASES

OF

STRANGULATED FEMORAL HERNIA,

ATTENDED WITH SOME UNUSUAL CIRCUMSTANCES.

By THOMAS CHEVALIER, Esq. F.L.S.

SURGEON EXTRAORDINARY TO THE PRINCE REGENT, AND SURGEON TO THE WESTMINSTER GENERAL DISPENSARY.

Read May 25, 1813.

CASE I.

ON the 2d of July, 1806, I was desired to visit Catherine Lewis, who was supposed to have laboured under enteritis for seven days. But as the medicines employed had produced no beneficial effect, and considerable tension of the abdomen had come on, it was thought that surgical assistance might be required.

On examination, I found a tumour as large as a middle-sized walnut, under Poupart's ligament, on the left thigh. It was remarkably firm; but as, from its form and extent towards the abdomen, I had not the smallest doubt of its being a hernia, I proceeded to the operation without delay. On

dividing the integuments, the tumour presented the appearance of a cluster of indurated absorbent glands, and of these, indeed, it was externally composed. I divided it by the most cautious dissection; and, after cutting through a mass half an inch in thickness, found I had made an opening into a cavity, which I enlarged as far as the external protrusion extended. Not a drop of fluid was discharged, and I could only just discover a small portion of strangulated intestine. I found this glandular cortex of the sac (if I may so call it) to be continued under Poupart's ligament, and it was not until I had divided the whole of this ligament by gradual dissection, from without, that I could obtain a satisfactory view of the protruded gut. I found it, however, so fast impacted in its rigid covering, that even then it was impossible to reduce it by any moderate pressure. It is necessary, however, here to remark, that as the incision through Poupart's ligament was made from without, the mouth of the sac was as yet undivided. I therefore introduced a director, and with a blunt-pointed bistoury divided the mouth of the sac towards the symphysis pubis, after which the intestine was easily returned. But the immediate gush of several pints of purulent fluid, mixed with fœces, and flocci of coagulable lymph, too plainly indicated the insurmountable mischief which had already been produced within the cavity of the abdomen, and of which she died in the course of the evening.

I opened the body the following day. The whole of the peritoneum was in a state of inflammation. That portion of it which formed the mouth of the hernial sac, was much more inflamed than the rest, and very considerably thickened. The protruded intestine had given way for nearly half its circumference, on that side which lay next the symphysis pubis, and from the aperture thus formed, the fæces had escaped into the abdomen. No gangrene, however, had taken place, but the opening appeared as if the intestine had been cut to that extent by a pair of blunt scissars.

This case affords a striking proof of the propriety of making the division of the mouth of the sac towards the symphysis pubis, in the operation for strangulated femoral hernia; and shews that less reliance is to be placed for the removal of the stricture, either in the division of the ligament described by Mr. Hey, or of Poupart's ligament, (both of which were completely divided, in the case I have now related, without producing a sufficient liberation of the incarcerated part) than on the division of the mouth of the sac. The intestine having given way, also, in this direction without gangrene, clearly shows in what part the most injurious effects of that pressure are likely to take place, and which, indeed, might be expected to take place in that situation, from the sharp and definite edge of the tendinous fibres, which pass from Poupart's ligament to the pubis, and which

form the inner boundary of the foramen, through which crural hernia descends. In the case I have described, it is also worthy of remark, that the peritoneum itself, at the mouth of the sac, was so much thickened, that I am persuaded the intestine could not have been returned without a very undue degree of violence, unless the mouth of the sac had also been laid open. And I have no doubt that the same obstacle is formed in many cases; as the pressure at the stricture must necessarily be reciprocal, between the part confining and the part confined; and must tend to excite inflammation and thickening in both, so that hence will arise one chief cause of insufficiency in any opening for the relief of strangulated hernia, in which a division of the mouth of the sac is not included.

CASE II.

This was a case of femoral hernia, in which the sac containing the intestine, was included within another sac, into which it had descended, so as completely to fill up the aperture, to which it firmly adhered. And as the cases of this kind on record are not numerous, I have thought it might not be amiss to lay an account of it before the Society.

Mrs. L. had been afflicted for some years with a

femoral hernia, from which, however, she had not experienced any great inconvenience. It had probably been in a state of strangulation for two days, as during that period she had no evacuation by stool, and had been affected with sickness. She had not, however, suffered much distress till this evening, when great pain came on, both in the part and in the abdomen, and the vomiting became more frequent and severe, on which account I was desired to see her.

I found her with a full and hard pulse, and considerable tenderness over the abdomen, which had much increased during the last two hours. But I was fully convinced, from the globularity and incompressibility of the tumour, that no effort to reduce the protruded parts would be likely to succeed. It is well known, that some fluid is generally effused into the hernial sac when strangulation takes place. In favourable cases, the pressure which is employed to reduce the intestine, will force this fluid into the abdomen, in consequence of which the tumour becomes somewhat less, and rather softer; but where this does not take place, and the tumour retains that incompressible rotundity to which I have alluded, it is evident that the stricture must be exceedingly tight, and the intestine consequently exposed to the most imminent peril. This symptom alone, therefore, will generally be a sufficient reason for proceeding to an immediate, or, at all events, to a speedy operation.

I therefore determined, in this case, to operate immediately, and release the intestine from its confinement, and to bleed the patient * *afterwards.*

On laying open the hernial sac, about a tablespoonful of fluid was discharged, and a substance presented itself unlike intestine, which, on tracing it upwards, I was soon convinced was another hernial sac contained within the former; I opened

* Bleeding is undoubtedly a remedy of great value for the relief of strangulated hernia; but it has been well observed, that its utility is chiefly confined to the early state of that occurrence; for, when the part has been long strangulated, and the strength of the patient is beginning to fail, from the influence of the disease, the debility induced by the loss of blood may greatly add to his danger, and be itself far more hazardous than the operation. A similar observation will hold good with respect to the warm bath, and the employment of tobacco clysters; each of which I have seen, in different cases, decide the patient's adverse fate. The kind of inflammation also, as well as the degree, demands as much attention in strangulated hernia as in other injuries. After compound fractures, when the strength becomes exhausted, the inflammation often degenerates into an asthenic kind, which demands a directly opposite mode of treatment to that which was at first required; and in which, therefore, bleeding may be productive of incalculable mischief. The same thing may, and I have no doubt often does, take place in many internal diseases, and in strangulated hernia: where asthenic inflammation may, therefore, spread from debility, and destroy the patient, even though the reduction of the intestine have been accomplished. Even the fatigue attending the employment of the warm bath, and other uncertain means, will often occasion more danger to the patient, on this account, than could result from the operation itself.

this with the greatest care: it contained about the same quantity of fluid, with some omentum, and a portion of the ileum. I divided the stricture in the direction of the symphysis pubis, and returned the protruded parts without difficulty.

This operation was performed between one and two o'clock in the morning. The patient was immediately relieved from much of the pain she had before suffered; and as she was much fatigued, she was laid in bed, and a solution of sulphate of magnesia was directed to be given every two hours. At eight o'clock in the morning I found the pulse still hard and strong; but the vomiting had ceased, and one stool had been procured. Twelve ounces of blood were now taken away, and the sulphate of magnesia was directed to be continued. Copious evacuations by stool took place in the course of the day, and the patient recovered without any untoward occurrence.

Some years ago, I saw another case in which one sac was included in another. This was in a female patient at St. George's Hospital, on whom the late Mr. Gunning operated for strangulated hernia. After opening the sac, something, which at first was supposed to be a portion of the intestine, was contained within it; but on attempting to reduce this, it was found attached to the mouth of the sac, and to have an unusual appearance. Mr. Hunter, who came in, perceived by pressing it, that it was

a thin transparent membrane, containing a bloody fluid; and, on opening it, it proved to be a second sac. Within this was the strangulated part, which readily slipped up on gentle pressure. This patient unfortunately died of peritoneal inflammation; and it was found, on dissection, that the left ovarium had been the part strangulated, from which inflammation had diffused itself generally over the cavity of the abdomen.

CASE

OF

EXTRAVASATION OF BILE

INTO THE

CAVITY OF THE ABDOMEN,

FROM RUPTURE OF THE LIVER OR GALL-BLADDER.

By ——— FRYER,

SURGEON OF STAMFORD.

COMMUNICATED BY T. COPELAND, Esq.

Read June 8, 1813.

ON June 7, 1803, Mr. Simpson's son, of South Witham, ten miles from this place, aged about thirteen years, received a violent blow from one of the shafts of a cart, on the region of the liver, which was succeeded by pain, and frequent vomiting of bilious matter. He complained of great sinking, and coldness of the extremities, and his pulse was weak, small, and fluttering.

Mr. Costall, surgeon and apothecary, of Market Overton, (who had been sent for immediately after the accident, and from whom the above account

was received) ordered the abdomen to be fomented; and, as the patient's stomach rejected every thing, he directed purging clysters to be occasionally thrown up: at the same time desiring that he should be kept still and quiet, and supported by broth, milk-pottage, &c. &c., as soon as the vomiting ceased.

In this state he continued until the third day (June 9,) when symptoms of inflammation coming on, Mr. Costall requested that I might be sent for. Mr. Cooper, surgeon of this place, (who was in practice with me at that time) visited the patient immediately, and found him labouring under considerable pain about the region of the liver; there was great tension of the abdomen, which was extremely sore to the touch, and his vomiting continued as frequent as at first, his stomach rejecting both food and medicine. The pulse was very quick, small and weak; the skin hot and dry; the tongue much furred; the urine high coloured; and he complained of some difficulty of breathing, and of great thirst.

Mr. Cooper ordered eight ounces of blood to be taken from him, and the fomentations to be continued, and, as he had yet had no proper evacuations from the clysters, directed that a few grains of calomel should be given every four hours, until it should effectually answer the purpose; after which, he was to take the effervescing mixture

with ten drops of laudanum every four hours; to be supported by beef tea, or whatever liquid food might agree best with his stomach, and to drink imperial, or toast and water to relieve his thirst.

The following day (June 10), he was much better, having had some motions; but his sickness still continuing, he was ordered one grain of opium every four hours, and was desired to go on, in other respects, as before.—Mr. Cooper saw him again on the 18th: he had, the day before, complained of great increase of pain, accompanied by vomiting, when Mr. Costall applied a blister, which appeared to relieve him. At this time he was completely jaundiced, and his stools were white: the swelling and tension of the abdomen were, however, much diminished, his sickness and thirst were abated, and in other respects he was better.

The same treatment was pursued until I saw him on the 20th, at which time the swelling of the abdomen was increased, and on a strict examination an evident fluctuation was perceptible. I saw him again on the 28th (twenty-one days from the accident). The abdomen was now very considerably distended with fluid; he did not complain of much pain; he had the facies Hippocratica, and appeared to be sinking fast.—It was astonishing to see how greatly he was reduced in so short a time, being as much emaciated, as if he had been labouring under a long chronic disease. Under these

circumstances, it was proposed that he should be tapped, as affording the only chance of relief. It was agreed to, and thirteen pints of what appeared to be *pure bile* were evacuated. He bore the operation very well, but did not seem to derive much benefit from it.

On the 2d of July, the account received of him from Mr. Costall was favourable; he had felt more comfortable, his bowels were regular, and his appetite good. On the 10th of July (twelve days from the last operation) it was repeated, and fifteen pints of the same bilious fluid drawn off. He bore the tapping better than before, experienced great relief, and though he was still much reduced, was evidently better.

On the 19th of July, (nine days afterwards) the operation was again performed, when thirteen pints of a similar fluid were taken away, with the same advantage. On the 7th of August the operation was repeated, and six pints only were drawn off. A purging had come on about a week before. His stools were of a natural colour; he was much improved in his looks, and his appetite and spirits were good.

From that time, there was no accumulation of fluid. He was ordered light tonic medicines, and very rapidly recovered his health and strength.

He is now a stout young man, living in London.

A case of very extensive division of the liver is recorded by Dr. Pearson, in the Third Volume of the Transactions of the College of Physicians, which caused almost immediate death.

Stamford,
May 14, 1813.

N.B. From an inquiry, addressed to Mr. Fryer, since this paper was read to the Society, it appears that no examination was made of the nature and composition of the fluid extravasated in the preceding case.

ON THE

MUSCULARITY OF THE UTERUS.

By CHARLES BELL, Esq. F.R.S. Ed.;
AND TEACHER OF ANATOMY IN GREAT WINDMILL STREET.

As midwifery makes no part of my occupations, I intend, in this paper, to confine my attention to the anatomical structure of the womb; or to such points of the pathology as are directly connected with the anatomy. But some facts have been forced upon my observation which have not hitherto been laid distinctly before the public. They have induced me to resume the examination of the muscular structure of the womb; and comparing what I have seen in the dead body, with what I have observed in the living, I shall endeavour to lay a connected account of this subject before the Society.

I have dissected the gravid uterus in all conditions—in women who, in consequence of fever, had died undelivered; in women who had died from flooding; and in women who had died in consequence of distortion of the bones: I have had two opportunities of examining the uterus ruptured by its spontaneous action; and one, in which the uterus had been ruptured by violence; and,

finally, I have examined the state of the uterus after death in consequence of the Cesarian section *.

In this way I have been led to attend to this subject as an anatomist, rather than as an accoucheur; an explanation which, I fear, will seem very necessary in apology for these observations.

Of the Muscular Structure of the Uterus.

The muscularity of the uterus is proved by direct ocular demonstration of the fibres in dissection; by the thickness of the fibres corresponding with their degree of contraction; by the visible action in the human uterus during life; by the resemblance of the laws of its contraction (as felt and as perceived in its consequences) to those which govern the contraction of the other hollow viscera; and lastly, by the vermicular and intestinal motions of the uterus as seen in experiments upon brutes.

The prevailing notion that the muscular fibres

* I wish that my present subject permitted me also to state what I have found on dissecting the parts after the use of the crotchet, and in particular where the forceps had been used, as I must presume, in a case improper for them. The injury which the seeming harmless instrument the forceps is capable of doing might then be proved, and a wholesome admonition given to the young surgeons.

of the uterus are very confused and scarcely perceptible, has prevented authors from founding the rules of practice on the sure ground of anatomy. And if it be possible to place this matter in a clear light, it may banish, perhaps, a certain vagueness which is much to be regretted in so important a department of practice. The most curious, and obviously useful part of the muscular substance of the uterus, has been overlooked; I mean the outermost layer of fibres which covers the upper segment of the gravid uterus. The fibres arise from the round ligaments: and, regularly diverging, spread over the fundus, until they unite and form the outermost stratum of the muscular substance of the uterus. The round ligaments of the womb have been considered as useful in directing the ascent of the uterus during gestation; so as to throw it before the floating viscera of the abdomen: but, in truth, the uterus could not ascend differently; and on looking to the connection of this cord with the fibres of the uterus, we may be led to consider it as performing rather the office of a tendon, than that of a ligament. It is familiarly known, that the subsiding of the belly in pregnancy, occasioned by part of the womb sinking within the brim of the pelvis, is the least equivocal sign of the approach of labour, and of the pelvis being of due dimensions: and in some measure this is also an assurance of a right presentation of the child. This layer of muscular substance operating on the round ligaments is well calculated to

assist in expelling the fœtus; but also in a particular manner it is provided for bringing down the womb in the first stage of labour, and it is well calculated to give the uterus and the head of the child the right position with regard to the axis of the pelvis. From the connection of the lower extremities of the ligaments with the tendinous insertions of the abdominal muscles, we can conceive that this muscle and these ligaments may shift the position of the womb, and carry it off from the support of the ilium; but otherwise we should be at a loss to conceive how the uterus by its own action could adjust the position of the orifice for the delivery of the child.

On the outer surface and lateral part of the womb, the muscular fibres run with an appearance of irregularity among the larger blood-vessels; but they are well calculated to constringe the vessels whenever they shall be excited to contraction.—The substance of the gravid uterus is powerfully and distinctly muscular, but the course of the fibres is here less easily described than might be imagined. This is owing to the intricate interweaving of the fibres with each other; an intertexture, however, which greatly increases the extent of their power, in diminishing the cavity of the uterus. After making sections of the substance of the womb in different directions, I have no hesitation in saying that towards the fundus the circular fibres prevail; that towards the orifice the

longitudinal fibres are most apparent; and that on the whole, the most general course of the fibres is from the fundus towards the orifice. This prevalence of longitudinal fibres is undoubtedly a provision for diminishing the length of the uterus; or for drawing the fundus towards the orifice. At the same time these longitudinal fibres must dilate the orifice, and draw the lower part of the womb over the head of the child.

In making sections of the uterus while it retained its natural muscular contraction, I have been much struck in observing how entirely the blood-vessels were closed and invisible; and how open and distinct the mouths of the cut blood-vessels became, when the same portions of the substance of the uterus were distended and relaxed. This fact of the natural contraction of the substance of the uterus closing the smallest pore of the vessels, so that no vessels are to be seen, where we nevertheless know that they are large and numerous, demonstrates that a very principal effect of the muscular action of the womb is the constringing of the numerous vessels which supply the placenta, and which must be ruptured when the placenta is separated from the womb.

I have observed further that although in producing contraction and thickening of a portion of

the uterus, by boiling it, or by other artificial means, the fibres are made very evident, and the blood-vessels greatly constringed; yet they are not so effectually closed as in the natural contraction of the muscular fibres of the uterus. Thus we are led to contemplate the uterus as more peculiarly destined for the safe delivery of the secundines, than for the reception and growth of the ovum. Although its system of vessels be admirably adapted for an increase of action, and for rapid growth, yet it is not so peculiar in this respect as in its muscular structure; for we find that where the fœtus lodges in the ovarium it grows, within the term of uterogestation, to the full size: but if the ovum separates from the ovarium, or from the Fallopian tube, in the example of extra-uterine fœtus, the woman dies of hæmorrhage, the blood flowing without being restrained by any system of muscular fibres capable of constringing the blood-vessels which are necessarily ruptured *.

The celebrated Ruysch discovered a circular muscle on the inner surface of the fundus of the uterus †. The use of this muscle, as he conceived

* See a case by Dr. Clarke. Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. Mr. Taunton shewed me the parts where a rupture of the Fallopian tube in a case similar to this of Dr. Clarke, had occasioned a fatal hæmorrhage into the cavity of the abdomen.

† Ruysch, Dec. 2, p. 34.

it, is to draw the surface of the uterus by a gliding motion from the corresponding surface of the placenta; and thus to separate it and cast it off. By some the existence of this muscle of Ruysch is not admitted; and it has been supposed that he was deceived by the appearance of tortuous vessels *. I have nearly an absolute reliance on the observations of Ruysch: and as I have made a section of the uterus, most exactly corresponding with the engraving in Ruysch's work, I must conclude that he was not deceived in what he saw.

In the papers of Dr. Hunter, published by Dr. Baillie, there is the first accurate observation of the concentric fibres which surround the openings of the Fallopian tubes; the description corresponding with the circular strata of fibres which Weitbrecht has seen encircling the mouths of these tubes.

Upon inverting the uterus, and brushing off the decidua, the muscular structure is very distinctly seen. The inner surface of the fundus consists of two sets of fibres, running in concentric circles round the orifices of the Fallopian tubes. These circles at their circumference unite and mingle, making an intricate tissue. Ruysch, I am inclined to be-

* By *Boerhaave* and *Albinus*. See in the Opuscula of *Sandifort* the words of professor *Germ. Azzoguidus*, who has also this idea.

lieve, saw the circular fibres of one side only, and not adverting to the circumstance of the Fallopian tube opening in the center of these fibres, which would have proved their lateral position, he described the muscle as seated in the center of the fundus uteri. This structure of the inner surface of the fundus of the uterus is still adapted to the explanation of Ruysch, which was, that they produced contraction and corrugation of the surface of the uterus, which the placenta not partaking of, the cohesion of the surface was necessarily broken.

Further, I have observed a set of fibres on the inner surface of the uterus which are not described. They commence at the center of the last described muscle, and having a course at first in some degree vortiginous, they descend in a broad irregular band towards the orifice of the uterus. These fibres, co-operating with the external muscle of the uterus, and with the general mass of fibres in the substance of it, must tend to draw down the fundus in the expulsion of the fœtus, and to draw the orifice and lower segment of the uterus over the child's head.

I have not succeeded in discovering circular fibres in the os tincæ, corresponding in place and office with the sphincter of other hollow viscera, and I am therefore inclined to believe that, in the relaxation and opening of the orifice of the uterus,

the change does not result from a relaxation of muscular fibres surrounding the orifice. Indeed it is not reasonable to conceive that the contents of the uterus are to be retained during the nine months of gestation by the action of a sphincter muscle. The loosening of the orifice, and that softening and relaxation which precedes labour, is quite unlike the yielding of a muscular ring.

Natural Action of the Uterus.

While the uterus retains its whole contents, the action of its fibres is slow and feeble. Its first movement is to shift its position to direct the orifice aright, and to sink down until the lower segment of the womb rests upon the brim of the pelvis: this it does by the operation of the muscular fibres on the round ligaments, and during this shifting of its position are experienced the true dolores præsagientes. When the waters are discharged, the contractions are more powerful, the child's head presses on the orifice, and the fundus and body of the uterus are more powerfully excited. Now the upper and middle part of the uterus contract; but it is evident that the lower part of the uterus must, during this contraction of the upper part, relax and stretch to permit the child's head to pass.—While the child is contained in the uterus, the muscular fibres can not greatly contract nor impede the blood in the

circulating vessels of its substance. But when the child is expelled, then the contraction of the fibres is considerable, and then they take that arrangement which is inconsistent with a free circulation of the blood; the vessels are constringed. By the time that the placenta is expelled by the contraction of the uterus, the vessels of the uterus are closed, and no active hæmorrhage follows.

Action of the Uterus producing Rupture.

I have examined two cases of uterus ruptured by its spontaneous action, and one in which the violent attempts at delivering the child ruptured it. In the two first examples the circumstances of the labour, and the appearances on dissection, had a close resemblance. The labour was going on apparently well, when, after a violent pain, the woman vomited a dark matter; on examination the child's head had receded; on putting the hand on the belly of the woman, the form of the child could be distinctly felt. Such was the description I heard when I came to open the body in the first case. I found the fœtus, cord, and placenta lying among the viscera, and the uterus contracted and drawn into the pelvis. The head of the child I found unusually enlarged by hydrocephalus. In the second case, the uterus only was brought to me. In both the uteri were largely

rent transversely, just within the orifice on the fore part; and the margins of the rents were thin and ragged. In the first, the orifice of the uterus was dilated and obliterated: in the second, the lips of the orifice were still distinguishable, being imperfectly dilated and rigid.

In the third case of rupture of the uterus, which I dissected, the circumstances were very different: I went to see a woman, who being remarkably distorted, I thought could not survive her labour. I found a gentleman engaged in assisting her; he had proceeded, I believe, with perfect propriety to deliver the woman with the crotchet; he had evacuated the cranium, and brought away the frontal and parietal bones; he had got the hook into the foramen magnum, and was endeavouring to bring down the base of the cranium laterally, to accommodate it to the flattened pelvis. In this however he could not succeed. On returning next day I found the patient dead: the body was afterwards conveyed to me. On opening the abdomen I found the uterus still containing the body of the child, and the placenta, but an arm and shoulder projected through a rent on the left side and lowest part of the uterus: it was covered with slime and mucus, and the lips or margin of the rent were quite black and sloughy. It required my whole strength, standing on the table, to draw back the remains of the child's head, which were wedged in the distorted pelvis.

In the first instance I think the cause of rupture was, that the dilatation of the orifice of the womb was insufficient to admit the preternaturally large head to pass. In the second, the rupture was owing to the rigidity and insufficient dilatation of the orifice of the uterus, while the muscular action of its body was powerful. We know very well, that a muscle during action acquires an additional power of cohesion, and consequently additional strength, but that when relaxed it is comparatively weak. This explains why the rupture takes place at the lower part of the uterus; for there we find, that during the most powerful contractions of the womb, there must be relaxation and dilatation to admit the child's head to pass, and that relaxation is weakness*. In the third case, the remote cause of the rupture was the obstruction to the labour, from the wedging of the child's head; the child being forced by the action of the womb into the pelvis, and by the pulling of the accoucheur in the operation of the crotchet, the uterus was bruised against

* I shall not presume to deny, that the vagina and not the uterus has been sometimes ruptured: yet from the general resemblance in the circumstances of the cases of ruptured uterus, and the appearance of the torn parts, I think the rupture takes place in the uterus, near the orifice. If the orifice of the uterus be relaxed and open, the vagina will not remain rigid, the child's head will descend: if there be no resistance to the contraction of the uterus, the violence of the action cannot be such as to tear the parts. The child and placenta being found in the cavity of the belly, declares the rupture to take place before the full descent of the head into the pelvis, that is, before the final dilatation of the orifice of the uterus.

the linea innominata: hence the appearance, peculiar to this case, of blackness and gangrenous sloughs on the edge of the rent in the uterus*. In this case also, the immediate cause of the rupture was the contraction of the uterus, in the attempt to force down and deliver the infant, the violence of which action falling upon the weakened part of the uterus, near the orifice, tore it: the head of the child being locked in the pelvis, was undoubtedly the cause why the whole child was not thrown into the cavity of the abdomen.

Muscular Action of the Uterus considered in the Case of Cesarean Section.

While in partnership with my brother, Mr. John Bell, an occasion occurred which made the performing of this formidable operation an absolute duty. As the description of what occurred during that operation, and the appearances which were presented on dissection, may not be without interest to some here; and as they have a direct connection with my subject; I shall take the liberty of stating them.

In proceeding to examine this woman as she lay with her back towards me, I was surprised to find

* The linea innominata was in this case very sharp; the skeleton is in my collection.

a large smooth tumour betwixt the thighs, which I could not readily recognize as the abdominal walls, thus distended and strangely pendulous. In this position of the pregnant uterus, with its fundus hanging down, we discover one consequence of great distortion in the pelvis, and an insuperable difficulty in the way of the operation of embryulcia, since the child's head does not present to the opening of the pelvis, and cannot be felt per vaginam.

My assigned station in this operation was to raise the tumour of the belly; to present the lower part of it; to prevent the intestines from protruding; to compress the belly, and to follow the receding sides of the contracting womb, and to excite the womb towards its ultimate contraction; on which latter circumstance we all agreed the woman's safety in the first period after the operation must chiefly depend. Mr. John Bell, with his characteristic neatness, made the incision. The incision through the walls of the abdomen was made a little towards the right side of the linea alba, and in the space betwixt the umbilicus and pubes: it was of length calculated to admit the child's head to pass, stretching the parts*. When the integu-

* The incision was made as low as possible, to avoid cutting the upper part of the uterus, and in the expectation of avoiding the placenta. In the operation by Mr. Thomson, (Med. Obs. and Enquir. vol. iv. p. 274) the middle of the incision was opposite to the navel. In Dr. Kellie's very interesting case, the incision wa-

ments and muscles were cut through, I moved my hands, which were spread upon the belly of the woman, so as to make the walls of the abdomen glide on the smooth surface of the uterus. The very great distension of the integuments, and their consequent thinness, made this necessary, to inform those who looked on that the abdomen was actually cut into; and indeed the surface, which now presented of a pale rosy hue, was not even what an anatomical student might have expected. It was matter of wonder to me, that no small vessels were perceptible on the living surface of the uterus, and no sinuses tinged with blood, considering that those vessels make so great an exhibition in dissection. But it was more a matter of admiration to me to observe the effect of the first touch of the knife upon the uterus; for instead of the form of a cut remaining for a moment, the fibres were excited to retract what would otherwise have formed the edges of the incision, and instead of a cut being perceptible, there was, in its place, a circular space, with concentric circles of fibres. Another thing remarkable was, that although the integuments and rectus muscle and substance of the womb were cut, yet there was not as yet a drop of blood to flow over the edges of the wound, no large veins were to be seen in the substance of

was made from two inches and a half above the navel to four inches below it. (Edinb. Med. Journ.) The necessity of evacuating the bladder, which lies above the brim of the pelvis, in cases of great distortion, is sufficiently apparent.

the womb; and in this we thought ourselves particularly fortunate.

But presently it appeared how much we had been deceived; for the substance of the womb being cut through, the lobes of the placenta rolled out. The placenta was unfortunately attached to the fore and lower part of the womb, and now, notwithstanding that no blood jetted from the womb, I was convinced that the incision must be through the larger blood-vessels, and I already despaired of the woman's recovery.

Mr. Renton, Surgeon of Pennycuik (who had, in a manner deserving the highest praise, delivered the woman on former occasions with the crotchet, in very difficult circumstances,) was prepared to break the membranes; to pass his naked arm into the uterus; to seize the child by the feet; and deliver it. This was done rapidly and dextrously by Mr. Renton passing his hand in a conical form below the lower edge of the placenta: the child was delivered safely, and is now alive. After the delivery of the child, the placenta was thrown out by the action of the uterus *.

The instant the operation was performed, the

* We did not see a portion of the intestines, owing to due pressure sustaining the lips of the wound; it has occurred in performing this operation, that they have come down into the surgeon's hands upon the rapid subsiding of the uterus.

mother was seized with violent vomiting; and now it required all my strength to compress the abdomen, and retain the parts against the operation of the diaphragm and abdominal muscles. For twenty minutes I continued pressing the belly, and compressing the uterus betwixt my hands. The wound of the integuments was dressed; stitches were introduced, and the intervals strengthened by adhesive straps; compresses were put on the abdomen, and the belly swathed. But that happened which I foresaw would be the consequence of ceasing to compress the uterus: the woman became more faint, and at last insensible; she lived only to the gratification of her wish, to become, at all hazards, the mother of a living child.

Dissection.

It was fully three weeks before I could procure the body for dissection, yet as this was during a severe winter, the demonstration of the cause of death, and of the state of the uterine contraction, was perfect. On opening the belly, I saw the uterus lying contracted; but the wound of it was gaping, the lips everted, and it now appeared as if the uterus had been cut from the fundus to the neck. This singular appearance and deception I attributed to the contraction of the body of the uterus, while the edges of the incision remained

paralysed and uncontracted*. The thickness of the womb was increased to four times the diameter it presented during the operation: but what most deserved attention was the appearance of the large vessels, now with open mouths, which during the operation were not apparent. From the mouths of those vessels the streaming blood had been coagulated, and now formed strings, reaching from the mouths of the vessels to the great cakes of coagulated blood which lay on each side of the abdominal cavity. Besides the coagulated blood which lay in the cavity of the abdomen, a large clot was in the cavity of the uterus†.

From this case we see, that when the substance of the uterus is cut, either the muscular fibres do not fully contract, or in their contraction in consequence of being cut across, they do not constringe the blood-vessels. The misfortune in the case was, that the placenta was attached to the lower and fore part of the uterus; and this, with the defect of action in the muscular fibres, was

* Precisely the same appearance presented in the case communicated by *Dr. Hunter, Med. Obs. and Enq. v.* 4. Mr. Thomson's incision was six inches in length of the gravid uterus: on dissection the uterus was found contracted to the size of a common melon; and the wound appeared nearly the whole length of its body.

† This corresponds with the dissection in the case communicated by Dr. Hunter.

the occasion of the death of the woman by hæmorrhage.

The circumstances of this case suggest very material improvements in the manner of performing the operation. Instead of cutting into the womb, as was done in the preceding case, I would recommend that a very small incision should be made, such only as would enable a finger to be introduced; by boring, aided by the disposition which the uterus has to dilate, another finger might be passed, and then a third, and at length the whole hand, in a conical form, might be forced into the womb. I further venture to suggest, that this should be done as far down upon the lower part of the uterus as the urinary bladder and the reflection of the peritoneum will permit; for at the lower part the uterus is least vascular, and most disposed to dilate. In the further prosecution of the operation, the child should not be suddenly extracted, but the feet being brought out by the opening, the body should be slowly delivered by the spontaneous action of the womb; and the whole operation performed as much as possible in imitation of the gradual progress of a natural labour: the only apology for hurry in the operation would be the separation of the placenta, or the compression of the cord in the narrow wound*, but the placenta could

* In the operation by Mr. Hunter, Med. Obs. and Enq. V. V, p. 227, the womb strongly contracted round the neck of the child,

not possibly be detached in the method now proposed, and it would be possible to guard against the compression of the cord.

The muscular structure of the womb becomes a subject of very great interest in connection with that of *flooding*; it has been proved by the sections of the uterus, made in different states of its contraction, that the order of the muscular fibres is calculated so as to close the vessels; that where nature has provided for the attachment of the placenta, there the broken vessels are guarded by the provision of the surrounding muscular texture; but we know also, that during this contraction of the superior part of the womb, the lower part dilates and relaxes. Now if the contraction of the womb be essential to the safety of the mother, what will be the effect of the attachment of the placenta to a part of the womb which must relax during the labour! Every one knows the peculiar danger of the case of *placenta previa*, that each labour pain, as it returns, increases the violence of the flooding, instead of checking it. In common

child, so as to retard the delivery of the head and press the funis; it is added, that Mr. Hunter soon overcame this stricture sufficiently to let the head be extracted.—By passing the fore and middle fingers into the womb, so that a finger might lie on each side of the cord, the pulsation of the cord would be free, however powerful the contraction of the uterus. But in truth there is no disposition in the wound to contract.

cases, breaking the membranes and accelerating the labour, checks the flooding, and secures the safety of the patient; but when the placenta is attached to the orifice of the uterus, the reverse of this takes place.

From attention to the muscular structure of the uterus I have been led to conclude, that in common cases of flooding, during labour, the hæmorrhage is not accidental, in any other meaning of the term, than as it proceeds from the place of the uterus to which the placenta is accidentally attached; that the placenta cannot be partially separated if it be attached in a regular circle to the fundus of the uterus; and that flooding on the commencement and during the progress of labour, is owing to an irregularity in the shape and attachment of the placenta.

When the placenta is attached in a regular circle to the fundus uteri, it cannot be partially separated, and cannot be separated bodily, until the uterus is permitted to have a great degree of contraction by the delivery of the child; the circular muscles of the fundus being agents in a double capacity, that is, both expelling the child, and in constringing the uterine vessels; by the time that the child is expelled, the vessels of the fundus are greatly diminished in diameter. Further, the place and strength of these muscles being perfectly regular and uniform, their action must have the

effect of equally drawing the surface of the uterus, which is in correspondence with the margin of the placenta, towards the center of the fundus, and consequently of separating the surface of the uterus from the placenta; but no one part of it will be separated until the general restriction is nearly completed. This will not be the case when the margin of the placenta extends irregularly, or when the placenta is attached to the side of the uterus. After the delivery of the child in cases of flooding, it is not uncommon to find a portion of the placenta low down in the uterus, and separated, while the greater portion remains attached to the fundus. In examining the inner surface of the uterus by dissection, I have seen the part corresponding with the placenta irregular in its form, and extending towards the side and neck of the uterus. In such circumstances of the attachment of the placenta, the retraction on the lower part of the womb being to a greater extent than the fundus, will account for the too early separation of that margin of the placenta which stretches towards the orifice, and also for the hæmorrhage, which is a consequence of this partial separation; but in progress of the labour, and after the discharge of the waters, the more powerful efforts of the uterus draw the muscular fibres more closely around the blood-vessels, and then the flooding ceases.

The flooding which attends the torpor of the uterus in any circumstances, when the connection

with the placenta is broken, will be very easily accounted for on recurring to the details of the anatomy given in the first part of this paper*.

* Some of the appearances described in this communication are illustrated in the figures of Plate III.

SOME OBSERVATIONS

ON THE

USE OF OPIUM

IN

UTERINE HÆMORRHAGY,

By Mr. STEWART,

LECTURER ON MIDWIFERY, &c. &c. &c.

Read June 22, 1813.

THE object of the following observations is to recommend a mode of treatment in uterine hæmorrhagy, which has been found very successful in alarming cases of that disease. Though this complaint has long engaged the attention of medical men, yet, as it must be acknowledged that it often proves fatal, any improvement in its treatment must be considered of importance.

Opium has by many been recommended in the treatment of uterine hæmorrhagy; but the extent to which it should be given, and the principles on which it can be exhibited with the greatest advantage, are not generally known, and therefore this remedy has not attracted that attention which it seems to merit.

With a view of illustrating the effects and utility of opium in uterine hæmorrhagy, it may be sufficient to give in detail only two cases where this disease took place before and during labour, and afterwards conclude with a few general observations on the mode of using that remedy.

CASE I.

On the 19th December, 1810, at seven in the evening, I was called to see Mrs. ———. I found she was reduced to a very alarming state, by uterine hæmorrhagy. Her countenance was ghastly; her lips pallid; her extremities cold; a convulsive tremor shook her whole frame; she had incessant thirst and vomiting, with low delirium; the pulse at her wrist was perceptible only at intervals, and from her faint state the hæmorrhagy had in some degree abated. The os uteri was found dilated so as to admit two fingers; and the placenta presented over it.

I learnt from the attendants that she had been flooding excessively for a month previous, and that during that period she had discharged at least a pint of blood daily.

Being convinced that her only chance of reco-

vering depended upon the speedy delivery of the child, I gave her eighty drops of laudanum, which, after waiting twenty minutes, was found to have produced no sensible effect; one hundred and twenty drops more were therefore given, which in ten minutes was followed by drowsiness, with a remission of the vomiting and tremors.

At eight o'clock the hand was introduced into the vagina, the os uteri gradually dilated, the placenta detached at one side, the membranes ruptured, and, the hand being carried forward, the child's feet were grasped, and brought into the vagina; the vomiting and restlessness again recurring, eighty drops of laudanum were given, which produced composure and a permanent cessation of the vomiting.

The fœtus which appeared to be of the seventh month, was easily extracted.

The hand was introduced immediately afterwards, and the uterus instantly contracted, separating the placenta, and forcing it into the vagina; from whence it was gradually extracted.

At nine o'clock fifty drops of laudanum were given, and at short intervals she took some gruel and brandy.

At ten o'clock I left her, having ordered a

draught containing sixty drops of laudanum to be given at two o'clock next morning.

At nine o'clock the following morning, I found she had taken her medicine, had slept two hours, and said she had no complaint; her pulse, which was one hundred and thirty, was very weak and intermitted.

I ordered her to take fifty drops of laudanum, some beef tea at very short intervals, and occasionally some gruel and brandy.

In the evening she was doing well, and her pulse was the same as in the morning. She took sixty drops of laudanum at bed-time.

The next day in the morning her pulse was one hundred and twenty, weak and intermitting; she had passed a comfortable night, and felt in every respect easy. She was ordered forty drops of laudanum, and the beef tea, brandy and gruel were continued. At night I found her the same as in the morning, and ordered her fifty drops of laudanum at bed-time.

On the following day her pulse was diminished in frequency, was stronger and more regular, and she said she had passed a good night.

As she had no stool for four days, she was or-

dered an ounce of castor oil which operated in the evening, the beef tea was continued, and she took thirty drops of laudanum at bed-time.

The two succeeding nights she took thirty drops of laudanum.

From this period she rapidly advanced to a state of convalescence without the occurrence of one untoward symptom, and in fourteen days from the time I first saw her she was able to engage in the management of her family.

CASE II.

The subject of the following case, was a very delicate woman, who during the last four years had been afflicted with severe pulmonary symptoms, which were always aggravated during her state of pregnancy, and threatened to terminate in phthisis pulmonalis.

When I first saw her, she was in the fifth month of her tenth pregnancy, she had a very severe cough, which seemed to threaten the bringing on abortion, and she was very much emaciated. By repeated small bleedings, and the use of anodynes, her cough was relieved, and for two months afterwards she enjoyed a tolerable state of health.

In the beginning of the eighth month of pregnancy, she rode a few miles out of town in a gig, and on her return thought herself refreshed by the exercise, and slept better the following night than she had done for some time previous. But on the following morning she was alarmed to find the bed clothes drenched with blood, and a considerable discharge continuing to come from the vagina. As she had experienced no pain, she imagined that by continuing at rest, and in a horizontal posture, the flooding would cease: in this she was disappointed, for the cough which usually attacked her in the morning supervening, the discharge became more rapid; at nine o'clock she became very faint; and before ten had fainted four times.

I first saw her at eleven o'clock, and I feared, from all the circumstances attending the case, that she had little chance of surviving. Her countenance was ghastly, her lips pallid, the muscles of her face were occasionally convulsed, her voice was so much changed that she could only speak in a very low whisper scarcely intelligible. She complained much of pain in her limbs, giddiness, ringing in her ears, severe and oppressive sickness, and she was attacked with frequent fits of vomiting, her breathing was laborious, and frequently interrupted by sighing, and the pulse at her wrist was scarcely perceptible.

On examination the os uteri was found so much

dilated, as to admit the points of two fingers, and the child's head presented.

The discharge of blood notwithstanding her faint state was considerable.

I immediately gave her one hundred drops of laudanum, and after waiting till it produced a degree of drowsiness, which took place in about twenty minutes, I proceeded to deliver the patient by turning the child.

As the os uteri was soft and yielding, by cautious perseverance the delivery was accomplished in an hour.

During this interval, as the patient was frequently attacked with distressing fits of irritability and oppressive sickness, one hundred drops of laudanum were given her at two different times, and each dose was followed by a remission of these symptoms.

After the child was extracted, I again introduced the hand into the uterus, and by gently irritating its sides, it immediately contracted, forcing the hand and the placenta into the vagina.

By compressing the abdomen with a bandage, and applying cold to the parts, the hæmorrhagy was permanently checked.

In a few minutes after the separation of the placenta, as her breathing had again become laborious, and she complained of distressing pain in her limbs, with a sense of sinking, I gave her a hundred drops of laudanum, which was followed by an alleviation of all these symptoms.

For seven hours she continued in a very alarming state, during which time I did not think it safe to leave her, and notwithstanding some brandy and gruel was given her every ten minutes, fits of general irritability and dyspnœa frequently recurred, which were always relieved by a repetition of the laudanum.

In an hour afterwards she was very considerably recovered, her extremities felt warm, the expression of her countenance became natural, she was not so much distressed with thirst or general irritability, and her breathing was regular, and not so laborious.

She was now able to bear the fatigue of cautiously getting her linens changed, for previous to this when she attempted to raise her head from the pillow, a sense of faintness immediately supervened, and had an attempt been made to move her whilst in this weak state, in all probability a fatal syncope would have been the consequence.

She had taken from half past eleven in the

morning, till seven in the evening of the same day, an ounce of laudanum without its producing any of the disagreeable effects, which usually attend the exhibition of large doses of opium.

Before leaving her, I ordered sixty drops of laudanum to be taken that night, and a similar dose at three in the morning, if not asleep; the brandy to be continued, or wine substituted.

She slept some hours during the night; the following morning her pulse fluttered, and could scarcely be counted; she was very much troubled with palpitations of the heart, but her thirst was not so urgent. She took eighty drops of laudanum at six A. M. and a similar dose at three P. M. the Madeira was continued, and beef tea was taken frequently in small quantities.

At night she felt better, and took sixty drops of laudanum at bed-time.

In the morning of the following day, she was still more revived; her pulse was regular though weak and frequent; the palpitations were not so troublesome; she had some sound sleep in the night; and appeared cheerful. The opium and regimen were continued.

She passed the next night quietly, but now her breasts became troublesome, attended with smart

fever, and an aggravation of the pulmonary symptoms; she had some castor oil which operated, and was followed by considerable relief, and at bed-time she took sixty drops of laudanum.

From this time she went on gradually gaining strength; the opiate was continued every night for ten nights, and she had every day during that time a gentle laxative.

By taking a nourishing diet and a moderate quantity of wine, in three weeks from the time of her confinement she was able to sit up.

The pulmonary symptoms which were so troublesome during her state of pregnancy, and which there was reason to fear might have proved fatal after delivery, almost entirely disappeared.

She was much distressed for some time by severe attacks of palpitations of the heart, which gave her great alarm: these were soon relieved by taking ten drops of the ammoniated tincture of iron twice a day, and a tea-spoonfull of volatile tincture of valerian when she perceived their approach.

Two arguments have been advanced against the use of opium in uterine hæmorrhagy.

The first is, that opium, acting as a stimulant, accelerates rather than retards the flow of blood in the uterine vessels.

The second is, that opium, acting as a sedative, produces a state of atony of the uterus, which prevents its contraction.

Both of these positions cannot be true; otherwise we must come to the conclusion, that opium excites the action of one set of muscular fibres, whilst it diminishes that of another.

Whatever effect opium may have on any part of the body, with which it does not come into actual contact, that effect must be produced either through the medium of the brain and nerves, or in consequence of sympathy through consent of parts; therefore its effects upon the uterus must be exactly similar to its effects on the vascular system.

That opium even in large doses does not produce atony of the uterus appears from experience, for in the foregoing cases, and also in many others, it has been exhibited in large doses, without its being productive of any such effect.

In considering the effects which opium produces on the vascular system, we must take into account the state in which a woman is left immediately after delivery. There is evidently a great and sudden

produced not only in the uterine, but likewise in the general system. The blood which circulated in such abundance in the large uterine vessels, is no longer necessary (the functions of that organ being changed), and must therefore be directed to some other part of the body. But great and sudden changes in the vascular system, we know, are followed by great debility. If we add to this, the sudden accumulation of blood which takes place in the abdominal veins, by the removal of their accustomed pressure, and likewise the most debilitating cause of all, the violent and almost uninterrupted muscular exertion, which generally attends the second stage of labour, we need not be surprised to find women in a languid and debilitated state, immediately after delivery.

If uterine hæmorrhagy occur when the system is in this weak state, the debility is not only increased, but a state of distressing irritability is likewise induced; the heart and arteries contract frequently and irregularly; and the patient's strength is rapidly diminished till she at last sinks.

Liberal doses of opium, by allaying this state of irritability, throughout the system, diminish the action of the heart and arteries, and support the strength, by removing the principal cause of debility.

The general rules which are necessary to be

observed, in exhibiting opium in cases of uterine hæmorrhagy, are few and simple.

First. Opium ought not to be exhibited, till we have determined that the natural efforts are insufficient to expel the child.

Secondly. When we have determined upon delivering the patient by turning the child, a large opiate, not less than eighty drops of the tincture, or four grains of solid opium, ought always to be given; and if the circumstances of the case will permit, we should wait twenty minutes if the tincture, or half an hour if the solid opium is given, before the hand is introduced.

Thirdly. As often as symptoms of general irritability, or great debility supervene, the opiate ought to be repeated, and the dose increased according to the urgency of the symptoms.

Fourthly. If the general system has suffered severely from the effects of the hæmorrhagy, the opiate must not be diminished in quantity, or suddenly remitted, although symptoms of irritability be not present.

Golden Square,
June, 1813.

OBSERVATIONS

ON THE

VASCULAR APPEARANCE

IN THE

HUMAN STOMACH,

WHICH IS FREQUENTLY MISTAKEN FOR INFLAMMATION OF THAT ORGAN.

By JOHN YELLOLY, M.D.

PHYSICIAN TO THE LONDON HOSPITAL.

Read July 27, 1813.

IT must have happened to every one accustomed to the examination of morbid bodies, to see appearances of vascular fulness in the villous coat of the stomach. Such appearances have very frequently been referred to inflammation; but they have probably been but little studied, because, in dissections, the stomach is seldom opened, unless the attention be particularly directed to that organ, either from something remarkable in its external appearance, or some particular symptom affecting it, which may have been the subject of obser-

vation during life. I have several times been present at the examination of bodies, where the vascularity of the villous coat of the stomach was so considerable, as even to give rise to suspicions, that this appearance had been produced by the agency of something deleterious. In some remarkable cases, too, which fell under my own immediate inspection, (particularly one of apoplexy, and another of hydrothorax,) the phænomena now mentioned, existed to a very considerable degree, without there having been present, during life, any symptom which could make an affection of the stomach looked for.

I was therefore induced to embrace frequent opportunities of viewing the state of the inner surface of the stomach; and I so often found in it the appearances alluded to, as to incline me to imagine, that the opinion which is commonly entertained, of their being marks of disease, is not well founded. I thought it, however, desirable to make a continued series of examinations as to this point, in subjects taken indiscriminately, and therefore without any reference to the disease of which they might have died; hoping, by this means, to obtain such a portion of evidence, as might warrant some deduction, as to the ordinary appearances of the villous coat of the human stomach, in the dead body. I shall therefore lay before the Society, an account of twenty successive dissec-

tions, made by me, with a more particular view to the state of the stomach: and shall then give the appearances which that organ presented, in the bodies of five criminals, who forfeited their lives to public justice, and where there might be expected to be as little deviation as possible, from natural and healthy structure, and appearance*. The twenty dissections were principally made in cases which occurred at the London Hospital, under the care of my colleagues, (the physicians and surgeons of that establishment,) or myself; and the appearances were generally noted down by me at the time of inspection. I shall give one of them separately; but as I am aware that a detail of cases, where there is no material diversity in the individual particulars, is very tedious, I shall reduce the others to a tabular form.

It may be proper to remark, that in removing the stomachs, for the purpose of examination, a ligature was made at each extremity, and a portion of the œsophagus and duodenum included within it; and in order that no unnecessary pressure should be made on the tender villous coat in the inversion, an incision was made in the anterior part of the stomach, from the extremity of the duodenum, through the pylorus, of sufficient size to admit of its being readily inverted.

* It will be obvious, from the dates, that several of the cases and observations have been added since this paper was communicated to the Society.

John Bate, aged 36, porter, was admitted into the London Hospital on Feb. 23, 1813, with general dropsy; and after the unsuccessful employment of various means for his relief, he gradually sunk, and died on May 11. There had been no affection of the stomach. He was opened on the day of his death.

In both cavities of the thorax, there was a considerable quantity of bloody serum, and some also in the pericardium. The heart was large and firm; and there was a small and slight adhesion of it to the pericardium. Some bloody serum was found in the abdomen; and a strong band attached the lower part of the ilium, to the peritonæum contiguous to it. The spleen was considerably larger than usual; and it adhered extensively and strongly to the diaphragm, and slightly to the colon. Its substance was firm; and the whole of its external surface (that towards the ribs) was covered with a thin layer of white, smooth, cartilage *. The liver was natural in appearance; but the cystic bile was very pale. Nearly the whole of the great end of the stomach, on the posterior part, including a surface of somewhat a round form, and of about five inches by four in dimension, was of a bright crimson colour, which arose from very numerous points, as if of extravasation, very near the internal surface of the villous coat, and a slight regular vascularity.

* A similar affection of the spleen is described in Baillie's Morbid Anatomy, p. 256.

Similar points, well defined, and of various sizes, were seen in other parts of the stomach, particularly near the pylorus. The plicæ were numerous, near the pylorus, and towards the left inferior extremity of the greater curvature.

No.	Name, &c.	Died.	Examined.	Disease.	Appearances of Villous Coat of Stomach.
1	James Taylor, aged about 55, wine porter.	1813. March 30.	1813. April 1.	Apoplexy; effusion of blood in Pons Varolii. Was subject to rheumatism. No affection of stomach.	Considerable portion of great end very vascular, and with occasional appearance of extravasation, in form of small points.
2	James Murray, aged 47, seaman.	April 13.	——— 13.	Severe accident in the leg, making amputation necessary. No affection of stomach.	Lesser curvature, for about four inches by three, and a small irregular portion round the cardia, with considerable, and rather florid vascularity. Points of extravasation, in several parts of great end, and pyloric portion.
3	Dan. M'Lauglin, aged 47, labourer.	——— 14.	——— 16.	Convulsive fits, following, in 3 days, amputation of the leg for an old ulceration, coming on at short intervals, and producing stupor. No affection of stomach.	One-third of the superficial dimensions, comprising nearly the whole of the great end, and a portion of the lesser curvature, exhibited minute purple vessels, without regular junction. Here and there points of extravasation.
4	Jer. Davis, aged 19, labourer.	——— 14.	——— 16.	Tetanus, coming on with lock-jaw, on April 9th, without apparent cause. No affection of stomach.	Slight extravasation in irregular points, in lesser curvature and great end. Œsophagus very vascular.

No.	Name,& c.	Died.	Examined.	Disease.	Appearances of Villous Coat of Stomach.
5	Thomas Holbird, aged 40, labourer.	1813. April 27.	1813. April 29.	Pulmonary consumption. No affection of stomach.	Lesser curvature, and various small portions in other parts, particularly at inferior part of great end, very vascular.
6	William Somerville, aged 56, labourer.	—— 28.	—— 29.	Extravasation of urine into perinæum from stricture; and consequent gangrene. No affection of stomach.	Slight crimson blush over principal part; and portions of distinct, and well defined vascularity, in several places.
7	Andrew Bailey, aged 26, seaman.	—— 30.	May 1.	Pleuritis following amputation at shoulder joint, on account of a severe bruise. A little vomiting before death.	Lesser curvature, with four square inches of minute vessels or points. Similar appearances in some other places.
8	Emanuel Francis, aged 40, seaman.	May 1.	—— 1.	Pulmonary consumption. No affection of stomach.	Two square inches of lesser curvature, and a portion at great end, with minute florid vascularity, and slight pointed extravasation.
9	Johan Dichtmeyer, aged 31, shoemaker.	—— 2.	—— 3.	Pulmonary consumption. No affection of stomach.	Great end, with dark crimson, uniform tinge. Lesser curvature, three inches by two, and neighbourhood of pylorus had portions of distinct vascularity, with a few extravasated points.

No.	Name, &c.	Died.	Examined.	Disease.	Appearances of Villous Coat of Stomach.
10	Benjamin Foynett, aged 53, ticket porter.	1813. May 9.	1813. May 11.	Pleuritis supervening on severe catarrh, to which he was subject. Occasional pains in stomach for some years.	Reddish blush over principal part. Some of the plicæ near the pylorus, much elevated, dark-coloured and semi-cartilaginous.
11	John Bate, aged 36, porter.	—— 11.	—— 11.	General dropsy.	Case given above, p. 74.
12	Thomas Gingham, aged 65, labourer.	—— 14.	—— 15.	Compound fracture of leg. No affection of stomach.	The lesser curvature, and much of both anterior and posterior, surfaces livid. Some vascularity and points near the pylorus.
13	Mary Roston, aged 27.	—— 19.	—— 21.	Ulcerated leg. No affection of stomach.	Very obscure vascularity near the pylorus.
14	Thomas Woodfield, aged 47, watch-maker.	—— 20.	—— 21.	Pulmonary consumption; with strictures, and enlarged prostate. No affection of stomach.	Two square inches of lesser curvature, and principal part of great end, amounting, in the whole, to one-half the superficial contents, with sometimes florid, but generally blackish purple vascularity, for the most part distinct. Some florid vessels also near the pylorus, and in the duodenum.
15	Joseph Francis, aged 45, seaman.	—— 21.	—— 21.	Compound fracture of leg, making amputation necessary. Slight sickness on last day.	Nearly the whole surface of a bright red colour, from small points; but there was little distinct vascularity.

No.	Name, &c.	Died.	Examined.	Disease.	Appearances of Villous Coat of Stomach.
16	James Sheppard, aged 22, labourer.	1813. May 25.	1813. May 25.	Ulceration of larynx, and of villous coat of small intestines. No affection of stomach.	No vascularity.
17	Eman. Evans, aged 70, labourer.	—— 26.	—— 27.	Peritonæal inflammation from punctured bladder. No affection of stomach.	Extensive florid vascularity in minute ramifications.
18	—— Wakefield, middle-aged man *.			Pulmonary consumption.	A considerable space on the posterior surface below the cardia, and a smaller at the lesser curvature and anterior surface, florid, and consisting partly of points and partly ramifications. Lines of fine vascularity along the plicæ.
19	Robert Gowlett, aged 34, labourer.	June 17.	June 19.	Irregular protracted fever. Dyspeptic complaints for some years; and latterly, irritability of stomach.	Almost whole surface with florid vascularity; sometimes in distinct vessels, sometimes in pointed extravasations.
20	Henrietta Hatt, aged 34.	—— 26.	—— 27.	Schirrhous uterus; large intestines contracted. Old syphilitic complaints.	Slight appearance of rather dark red vascularity and points, both in the lesser curvature and great end.

* Some mistake arose as to the name and the description of this man, at the time of dissection, which I have not been able to rectify.

Before I make any remarks on the cases which have been given, and the appearances which they offer, I shall proceed to lay before the Society a description of the state of the stomach in five malefactors, who suffered death for murder, and who, before their execution, were in good health *.

CASE I.

Philip Nicholson, a man of about 30 years of age, was executed at Penningden Heath, near Maidstone, on the 23d of August 1813, at two o'clock in the afternoon. The body was taken to Bromley the same night, and was opened in my presence, and the stomach examined by me, on the following day, at 3 o'clock in the afternoon.

The whole of the abdominal viscera were loaded, as if by minute injection, with dark-coloured blood. Here and there, however, there were florid vessels, which were distinctly traceable into dark-coloured ones.

The stomach had its external vessels very turgid. It had no fluid contents; but on inverting it, after

* I was indebted to the kindness and liberality of several professional friends, for the opportunity of these examinations.

an incision was made in the anterior part, through the pylorus, the whole cavity was found lined with dark-coloured, clotted blood, which was pretty firmly attached to the villous coat and its mucus, and came off, but with some little difficulty, on putting the whole into water. Much of it, however, still continued to hang about the plicæ, at the great end, though the other parts were freed. The plicæ were distinct over the whole stomach, but not much elevated. Where the blood was washed off, it discovered the whole surface of the villous coat of a red colour; dark, where a portion of the blood continued to adhere; but florid, where it had been separated. The florid appearance was produced by minute vessels, which were, in general, distinct; but here and there in points, and occasionally in apparent daubs, consisting of extravasations, more or less extensive, and when more closely examined by a glass, divided into smaller portions of extravasation. The vascularity was unequal, being sometimes in irregular lines, with small portions of the proper straw-coloured hue of the villous coat interposed. Where the straw colour was pretty well marked, (which was in very few places,) there were still seen appearances of faint, and minute vascularity, in the substance of the villous coat, which imparted a very obscure red tinge to the straw-coloured hue.

A drawing of the appearances which a small

portion of the stomach exhibited, was made on the same day and accompanies this paper.

On dissecting off the villous coat, its inner surface was found to be covered with numerous vessels, which were connected with larger ones, and were traceable into the substance of the villous surface.

The stomach was reverted; and on examination the following day, it was found, in many places, to have lost the florid vascular appearance above mentioned, and to have become of a pretty uniform crimson hue. It was then put into rectified spirit; but in the course of a few hours, was deprived, not only of the slight remains of vascularity which it possessed, but altogether of its sanguineous hue, assuming a brown tint, which it still preserves *.

CASE II.

Charles Masureaux, a young French prisoner, was executed at Gillingham in Kent, on Monday the 23d of August, 1813, early in the forenoon.

* Nicholson was reported to have died unusually hard, and to have been greatly convulsed. *Times Paper* of Aug. 25.

The stomach was taken out on the Tuesday, was sent to me in London on the Wednesday evening, and was examined on the Thursday morning.—It had been tied up at both openings, and a portion of the contents left in it. It was transmitted in a jar, at my request, without spirit or other fluid put up with it.

The external surface was very vascular, and of a light purple hue.—There was a large spot near the pylorus, and another in the greater curvature, of a green colour, which extended through the whole substance of the stomach; but there was no diminished cohesion in these parts. The stomach contained about 3 or 4 oz. of bloody, thick, and somewhat frothy fluid. The whole of the villous coat (with the exception of the green spots, and some dark coloured streaks, which answered nearly to the plicæ of the stomach,) was of a bright crimson colour. No vascular appearance was perceptible in any part of the stomach, except in one spot near the pylorus, and in another in the lesser curvature, near the cardia, where a distinct portion of vascularity was seen at the extremity of the villous coat. Very obscure vessels were observable between the villous and muscular coats, on dissecting off the former, at various places.

CASE III.

William Cornwall, aged about 25, was executed at Woodford, at 11 o'clock in the forenoon, of Monday the 9th of August, 1813. The body was conveyed to town on the same day; and was opened in my presence, and the stomach examined by me, at half past two o'clock on the following afternoon.

The whole surface of the body, (but particularly the lower extremities) had on it numerous small vesications in the form of wheals, without redness, of about an inch and a half in length, and a tenth of an inch in width.

The large veins, on the external surface of the stomach, were most of them moderately distended with blood, and the ramifications went to considerable minuteness, and were most apparent in the smaller curvature. The whole of the intestinal canal was minutely injected with blood, which was, for the most part, of a dark crimson, or purple, but here and there, of a florid hue.

The stomach had no remains of food in it; but it contained much thick mucus, which adhered to

the whole inner coat. There were florid patches of vascularity in various parts of the whole inner surface of the stomach; which were most remarkable in the posterior part, towards the left side, and in the lesser curvature, for about two inches from the cardia. The general character of the vascular appearance, was similar to that mentioned in the case of Nicholson.

CASE IV.

John Denton, aged 45, was executed at the Old Bailey, on Monday Sept. 20, 1813, at eight o'clock in the forenoon, and was opened in my presence, and the stomach examined by me, at twelve o'clock at noon of the same day.

The small intestines were very vascular, but the colon was free from any appearance of vessels; and the stomach was not unusually vascular in its external surface. There was a strong contraction, at about one third of the distance between the pylorus and the left extremity of the stomach, making a very well marked separation between the pyloric and cardiac portions. Several ounces of coffee-coloured fluid, were found in the stomach. Plicæ were diffused over every part of its inner surface, except for about an inch and a half round

the cardia: they were very much contracted at the place mentioned as separating the pyloric and cardiac portions.

The colour of the villous coat throughout, was of a light crimson, varying slightly, however, in degree of brightness; sometimes being almost florid, and sometimes rather dark. Here and there, portions of a light straw colour occurred in streaks; but in these streaks very minute vascularity might be discovered by the naked eye, and better by a glass. The redness consisted of minute vessels, which rose up nearly to the surface of the villous coat, and diverged in still smaller branches, ending sometimes in a minute point, as if of extravasation, which was rather darker than the vessels, but incapable of being wiped off.

In a very few places, there lay attached to the villous coat, with mucus adhering to it, a small portion of blood, which, with the mucus, easily separated, and left beneath, a slight appearance of vascularity, but not more considerable than in most other places. A similar deposit of a portion of blood, occurred, in a slight degree, in a small portion of the duodenum which was removed with the stomach, but here the vessels were more continuous, and could easily be traced along the villous coat. The appearance of vascularity in this part of the

CASE V.

James Leary, aged 42, was executed at the Old Bailey on Monday, Sept. 20, 1813, at 8 o'clock in the forenoon, and the stomach was examined by me, the following morning, at half past 11. About an ounce of thick dark-coloured mucus was found in it, which barely gave a red colour to water. Its inner surface was every where covered with plicæ, except for a short space around the cardia, and the whole presented an irregular mixture of straw-coloured and red lines; the red lines, for the most part, at the extremity of the plicæ, but not regularly so. The colour was generally of a florid hue, except where it dipped down between the plicæ; and there it was crimson. Around the pylorus, there was an irregular ring, of about an inch in width, of more continued vascularity. The redness was sometimes in the form of distinct vessels, and sometimes of extravasated points; but the vascularity was less minute than in the case of Dutton, and had more the character of that of Nicholson. The colour of the whole was much darker on the Wednesday morning.

From the statements which I have given, it may, I think, be fairly inferred, that, in the villous

coat of the stomach, appearances of vascular fullness, whether florid or dark-coloured, in distinct vessels, or in extravasations of various sizes, are not to be regarded as unequivocal marks of disease. They occur in every variety of degree and character, under every circumstance of previous indisposition, and in situations where the most healthy aspect of an organ might be fairly expected. They are found in every part of the stomach, but principally in the posterior part of the great end, and in the lesser curvature; and they cover spaces of various extent, but are generally well defined, and terminate abruptly.——These circumstances have been confirmed by a great number of other examinations, which I have, at various times, had occasion to make; and I am inclined to think, that the first series of cases, may therefore be regarded as a fair average of the appearances seen in the adult human stomach. In young subjects, I should imagine, there is in general little vascularity seen after death; for in the 16th case*, (that of a young man of 22,) there was none apparent; and of the bodies of two boys, which I have since examined, one, where death was produced by an abscess, exhibited a very obscure portion; and the other, where the cause of death was a fracture of the occipital bone, shewed none †.

* In the last case, the whole surface of the small intestines was covered with small florid vessels, generally giving the appearance of small transverse parallel streaks.

† Vide Table, p. 379.

Two coloured drawings of the appearances of vascularity, which were assumed in two cases which came under my view, are annexed to this communication.

The appearances which I have described, preserve their distinctness for a short time only, being best marked on the first day, and soon after, but at irregular periods, becoming more obscure; the parts which were vascular acquiring a dark red, or purple tinge, which loses itself gradually. This effect more readily takes place when the villous coat is in contact with a fluid, particularly water. They exist in the body of the villous coat, and in general appear to be greatest, where that membrane is the least firm and resisting. Careful dissection discovers a fine net-work of veins between the villous and the muscular coat, from which the minute vascularity of the former evidently proceeds. This is very often capable of being traced, through the semi-transparent mucous coat, into larger veins beneath, by gently stretching the mucous coat, so as to render it thinner. The arteries are always empty, or very nearly so.

The vascularity now mentioned, often possesses a starred appearance, from the circumstance of its spreading in minute vessels, continually ramifying into smaller ones, to very near the extremity of the villous surface. A slight degree of friction, with the point of a scalpel, will open the minute extre-

mities of the vessels; but I have never observed, that even by squeezing the larger branches, in a retrograde way, effusion into the cavity of the stomach could be produced, so as to stain a white substance which might be applied to the villous surface.

An appearance, very similar to the vascularity now described, is easily produced by injecting the veins (when there happens to be but little blood in them) with red-coloured injection; in which case, the villous coat, to the naked eye, but still more when a magnifying glass of moderate power is employed, exhibits a branched, or slightly stellated form of vessels, so descriptive of those which are seen in the human stomach *. If the veins, when injected, contain blood, the blood is forced, by the injection, into more remote branches, and at last escapes by rupture.—An appearance, a good deal like this, also takes place by injecting the arteries; but the vascularity now mentioned can be completely imitated, by forcing back with the finger, or the back of a scalpel, the

* Isinglass, or calves foot jelly, rubbed up with a proper quantity of colouring material, was the injection employed. It was thrown in through a pipe fixed on the coronary artery or vein, by a syringe, which contained about an ounce. The stomach was inverted, the pyloric extremity tied, and the pipe brought out at the cardia, which was slightly enlarged, if necessary, and a ligature (as far as the pipes would admit,) placed on it. By this means, the flowing of the injection through the villous coat was kept under view.

blood from the larger branches of veins into the smaller ones, by which means a species of minute injection into the very extremity of the villous coat, most readily takes place. Where a few larger veins have been apparent, this effect can be produced without the least extravasation, to a considerable extent; more particularly when the coats are thin.

I have never been able to produce, satisfactorily, a passage of injection from the artery to the vein, either in the stomach or intestines. The termination of the artery in the vein, must be very remote in the villous covering; for when these vessels are filled by injections of different colours, they are found to run, side by side, as far as they are capable of being traced.

There is a very remarkable similarity in the appearances exhibited in the stomachs of each of the malefactors, whose cases are mentioned above; and a general resemblance apparent between them, and the stomachs of persons who have died of natural death. In the former, however, the vascular character is more universal, and more vivid; and there is, besides, a disposition to effusion of blood into the cavity of the stomach, which does not occur in the latter. These differences may readily be accounted for, by the circumstances in which the vascular system is placed, before the total cessation of life, in persons who die by

hanging; for in them, the usual disposition to vascular fullness in the stomach, is increased by the loading of the venous system, which occurs in consequence of the difficult transmission of blood, from the right side of the heart, during suspension.

In considering the state of an organ after death, with reference to the circumstances under which it may have appeared during life, it is necessary to consider, that in the latter case, both systems of vessels are filled with blood; while, in the former, blood is found in the veins only, the arteries being nearly, if not entirely empty*. It is likewise important to remark, that it is not from injections, that we can form any opinion as to the colour of parts, or the state of their circulation during life. Coarse injections will fill only large vessels; while fine injections will exhibit those which, like the vessels of the eye, are incapable, from their minuteness, of conveying red blood in the healthy subject. There is, besides, a considerable difference between the uniform colour of a living part, where the finest glass can discover no separation of vessels,

* ——"et a morte semper, arteriæ magis et magis inaniuntur, furtim et sensim, donec penitus albæ, et absque vestigio sanguinis sint, unaque cum membranis mesenterii pelluceant, a quibus non facillime distinguuntur." HALLER's Opera Minora, tom. 1. p. 200.

If any blood were contained in the minute arteries, it would be extravasated in injecting them, which I have never seen to occur with the arteries of the stomach, though it sometimes happens, as I have already stated, with the veins.

and the vascular distinctness produced by injection.

These circumstances apply strongly to any deductions which we may endeavour to make, as to the usual state of the mucous coat of the stomach during life, from its appearance after death. It is, indeed, extremely difficult to form an adequate conclusion as to this point, and authors have given various opinions relative to it. By some it has been stated to be white *; by others to be reddish †; by others to be greyish, bordering upon yellow and red ‡; clay-coloured or reddish §; or strongly marked red ||.

I have frequently seen the human stomach soon after death, and in such parts of it as were free from vascularity; it had usually a light straw-coloured tinge ¶: but, from the analogy of the mucous covering of the mouth and fauces, and of

* Dumas, Principes de Physiologie, tom. iv. p. 241.

† Cuvier's Leçons d'Anatomie comparée, tom. iii. p. 353.

‡ Boyer's Traité complet d'Anatomie, tom. iv. p. 337.

§ Sœmmering de corporis humani fabrica, tom. vi. p. 220.

|| Bichat, Traité des Membranes, p. 44.

¶ In dogs which have been hung, I have seen it with a slight crimson blush nearly over its whole surface, which is most apparent at the plicæ, and seems to consist of minute crimson points formed as if by the projection of minute straw-coloured villi on a red surface. This appearance, I apprehend, is in some degree dependent on the mode of death. In pigs, I have always seen it of a light straw colour, with a slight crimson blush over a part of its surface.

the urethra, it is probable, that when circulation is going on in the stomach, its inner surface is of a pale red hue, arising from vessels so minute as to give an uniform colour, without any appearance of distinct vascularity*. After death, the arteries and minuter veins are almost wholly emptied of their contents, and thus the colour of the villous coat is removed; but by dissection it will generally be found, that fine vessels are discoverable in the cellular membrane, which is interposed between the villous coat and the muscular. The removal of the colour, if we may judge from the analogy of the mucous membrane of the mouth, takes place very speedily.

It is difficult to ascertain in what way vascular appearances, such as those described by me, originate. That they take place about the close of life, is highly probable; but I feel myself unable satisfactorily to account for the mode in which they are produced. They are wholly venous, as is also the vascularity seen in many other parts of the body after death; the arteries, to which the veins which are so distended correspond, being

* The colour of the villous coat of the stomach and intestines is much alike in the dead body; being in both a light straw colour. Bichat states generally, that the natural appearance of the former, (meaning of course in the living body,) is a strongly marked red; and he gives an instance of a wounded and inverted portion of intestine, in which there was the redness, 'qui caracterise cette surface dans l'etat naturel.'

generally empty. It would therefore appear, that there is a power capable of being exercised in the artery itself, which carries on the blood to the capillaries, or to the veins, after the further supply of fresh blood from the heart is stopped; and that there is thus a species of accumulation produced in the veins, which is adequate to the production of the phænomena in question *.

In men who have been hanged, there is an obvious cause of accumulation in the veins; and the same cause seems to act, in a smaller degree, in cases of ordinary death. It operates also, in death by drowning; but I have had no opportunity of ascertaining whether, in this case, the same appearance of stomach is produced, as in suspension. The striking vascularity so often observable in that organ after death, in consequence of venous accumulation, seems to be, in a great measure, referable to the peculiar laxity of the medium in which its blood vessels are placed, and to the great number with which it is supplied. Hence, likewise, the disposition which it exhibits to effusion of blood, as well during life as in death, from suspension.

* 'Etenim ubi cor sanguinem allatum in arterias promovere non amplius valet, illa vis (elastica) ad urgentem in venas sanguinem sufficit. At si vis ista elastica simul cum vita perditus v. c. arteria in os mutatur, arteria quoque post mortem sanguine plena conspicitur.'

SŒMMERING De Corporis Humani Fabrica, tom. 5. p. 64.

The different degrees of colour, from dark purple to florid, which I have noticed as being seen in the vessels of the villous coat of the stomach, appear likewise occasionally in the veins of the mesentery and intestines. They afford examples of arterial hue, or a certain portion of it, continuing in blood, some time after the reflection of an artery into a vein. There are many facts which prove, that this change of arterial into venous blood may, under some circumstances, be accelerated or retarded in the living body; and Mr. Hunter has observed, that there is generally a palpable difference in the degree of darkness of venous blood, taken at different distances from its source in the arteries; for instance, at the hand, and the bend of the arm *.

The precise circumstances under which arterial colour is preserved after death, are not altogether known. The florid hue seems to be an exception to that in which blood usually appears in the dead body; for there the arteries, (when they are not empty) as well as the veins, contain dark blood. This change from the proper colour of the blood contained in the arteries, is supposed, by M. Bichat†, to take place before death; for he is of opinion, that in most instances, for some little time previously to the extinction of life, the whole of

* Hunter's Treatise on the Blood, Inflammation and Gun-shot Wounds, p. 69.

† Anatomie Générale, tom. 2.

the blood which circulates through the body, is dark; and that, where any surface after death is found to be florid, (and he instances the mucous membrane of the nasal fossæ as being occasionally so) it has continued in that state by means of its capillaries, which he conceives are not easily affected by changes which may have taken place in the circulation of larger vessels.

This conclusion, with regard to the capillaries, would merely provide for their continuance in the state in which they existed during life; but it is hardly reconcileable with the enlargement which, after death, is so palpably seen to have taken place in them, in the human stomach. Such enlargement can scarcely have been produced, except by a force sufficient to overcome the resistance made by the parietes of these minute vessels to the augmentation of blood; and for this force, it is difficult to look except to the arteries; particularly as those of middle and smaller size are, after death, found to be freed from blood. In this case, however, the blood last projected, might, if dark, have been expected to impart to such capillaries, a dark, instead of a light colour; which in many instances, it has been seen, is not the fact.

The change from florid to dark coloured, or from dark to darker red, which, as I have observed, takes place in the colour of the minute vessels of the stomach, in the course of a short

time, is in some degree analogous to that change, which Mr. Hunter has observed to occur, by rest, in the colour of arterial blood, whether contained in aneurismal sacs, in cellular membrane in consequence of extravasation from wounded arteries, or in the brain after apoplexy *.

The diffused redness, to which I have stated that the distinct vascularity of the villous coat soon gives place, occurs in a longer or shorter time, without any obvious cause for such difference. It seems to be the effect of transudation from the coats of the containing vessels; for I have seen, on inverting a vascular stomach, extending it upon a flat surface, and keeping it moist and undisturbed, that a blush is communicated from both larger and smaller veins to the contiguous cellular membrane, which very gradually increases in extent: while such parts of the villous coat as possess minute vascularity, lose it under such circumstances; the interstices becoming coloured by the transuding fluid, so as to give the whole of the surface an uniform crimson or purple tinge. The effect mentioned, I have observed to commence, in a recent stomach, in the course of a day, or a day and half, but sooner in one which is less recent, though not at all putrid. Putrefaction will doubtless increase, but it does not seem at all necessary to transudation.—This diffusion of co-

* Hunter, l. c. p. 65.

lour is, therefore, analogous to the transudation of the bile from the gall-bladder, which is so very generally observed in the examination of bodies *.

The slight resistance which dead matter is able to give to a contained fluid, is proved (if more proof than what the gall-bladder affords is necessary) by the employment of any two fluids, which are nice tests of the presence of each other. Thus, in a portion of inflated recent intestine, when the mesenteric arteries are carefully injected with solution of prussiat of pot-ash, and the veins with solution of green sulphat of iron, no effect is perceptible for a short period; but very soon the blue colour is produced, in the whole course of both systems of vessels, to considerable minuteness, and at the same time. If the carotid artery, or a portion of intestine (both of them recent) be filled with either of those fluids, and tied, and the centre be made to dip into a small vessel containing a portion of the other fluid, it becomes very speedily tinged with blue precipitate, at the place of contact.

Are circumstances of vascularity affected by

* HALLER refers an appearance of transudation from the intestinal vessels of a female who died of erysipelas in the leg, to inflammation, though there is every reason to suppose that it occurred after death. "Intestina flatu insigniter distenta, tota inflammata erant, non quod vascula unice distenderentur, sed quod cruor secundum totam longitudinem arbuscularum vasculosarum in cellulositatem effusus, lineam obscure rubentem, in vasis circumpositam efficeret."—*Opera minora*, tom. iii. p. 349, obs. 53.

thinness of coats?—The coats of the stomach vary very much in thickness in their different parts; the whole substance being sometimes so thin at the great end, as readily to admit of making out through it, dark figures on a light surface. In one case of this kind, the weight of two oval portions of similar size varied about three fourths: the portion taken from the fundus amounting to 5⅛ grains, while that taken from a part about midway to the pylorus (where this stomach seemed to be thickest) amounted to 22¼ grains. This stomach admitted the injection of its arteries close to the part where a ligature had been placed round the oval orifice, without extravasation; and another stomach allowed the injection to pass, with the same success, over a portion, which, to judge by figures seen through it, was equally thin.

The veins, likewise, when pressed backwards, minutely injected their smaller branches, just as has been described to take place, in ordinary circumstances of venous turgescence, without any effusion being produced into the cavity of the stomach; for the blood, in the minutest extremities of these vessels, was incapable of being wiped off, or of giving any tinge to a white surface applied to the villous coat in which they terminated. This last mentioned circumstance, I have likewise frequently remarked, in cases where the great end of the stomach was nearly as thin, as in the stomachs above mentioned, if not equally so. Where there

was, however, the slightest cut in the villous surface, the vessels were divided, and consequently effusion took place.

The difference of thickness which occurs between different parts of the same stomach, is produced by variations both in its villous and muscular coats; for I found that of two equal oval portions of the same stomach, one of which was taken at the great end, and the other near the pylorus, in the lesser curvature, the former, weighing six grains, had its villous coat consisting of $2\frac{1}{2}$ grains, and the peritoneal and muscular together of $3\frac{1}{2}$ grains; while the latter, weighing $19\frac{1}{2}$ grains, had its villous coat consisting of seven grains, and its peritoneal and muscular together, of $12\frac{1}{2}$ grains *. The thickness of the peritoneal coat appears to be pretty uniform; but that of the muscular and villous to vary, not only in different stomachs, and in different parts of the same stomach, but in relative proportion in such different parts.

* It may be proper to mention, that the weight of the villous, and of the peritoneal and muscular coats of nine similar oval portions of this stomach, was taken with some care, the dissection being made after separation from the stomach. In three other similar portions, the peritoneal and muscular coats alone were taken, the villous having been dissected off previously to removal. The following are the weights in grains, viz.

Villous coat -	$2\frac{1}{2}$	$4\frac{1}{2}$	5	$5\frac{1}{2}$	$8\frac{1}{2}$	$7\frac{1}{2}$	$7\frac{3}{4}$	$7\frac{1}{2}$	7				
Peritoneal and muscular together -	$3\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$7\frac{1}{2}$	$6\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{1}{2}$	9	$12\frac{1}{2}$	$3\frac{3}{4}$	$11\frac{1}{4}$	$17\frac{1}{2}$	
	6	$7\frac{1}{4}$	$8\frac{1}{2}$	13	15	16	$16\frac{1}{4}$	$16\frac{1}{2}$	$19\frac{1}{2}$				

Mr. HUNTER, in his valuable paper on digestion after death, makes some observations relative to the great end of the stomach, to which, as being intimately connected with the subject of this paper, it is necessary that I should advert.

"There are few dead bodies," he remarks, "in "which the stomach, at its great end, is not in "some degree digested; and one who is acquaint-"ed with dissections, will easily trace these gra-"dations. To be sensible of this effect, nothing "more is necessary than to compare the inner "surface of the great end of the stomach, with "any other part of its inner surface; the sound "portions will appear soft, spongy, and granu-"lated, and without distinct blood vessels, opake "and thick; while the others will appear smooth, "thin, and more transparent; and the vessels will "be seen, ramifying in its substance; and upon

The thinnest portions were from the great end, the others from different other parts of the stomach, but the thickest were taken near the pylorus, particularly the heaviest portion (17½.) The mucous coat had been dissected from this portion before it was taken out, so that the united weight was not known; but it could not be less than twenty-four grains.—It is obvious that there are various sources of error in ascertaining, very correctly, the weight of such soft and yielding parts which are to be separated in equal portions. That there is a considerable difference in the quantity and proportion of each coat, in different parts of the same stomach, seems to be all that it is of any consequence to know.

I should imagine that it is but seldom there is so much disparity between the thickness of different portions of the same stomach. The great end is not unfrequently extremely thin.

"squeezing the blood which they contain, from "the larger branches to the smaller, it will be "found to pass out at the digested ends of the "vessels, and to appear like drops on the inner "surface *." These effects, he attributes to digestion, by the gastric juice, in the ducts of the glands which secrete it.

With every respect for the high authority of a gentleman to whom the professional world is so much indebted, I shall state to the society, the circumstances in which my own observations have not agreed with those of Mr. HUNTER, as to some of the points mentioned in the quotation just given.

The great end of the stomach certainly appears, in general, to be smoother, thinner, and more transparent than the other parts; but its thinness does not apply to the *villous* coat alone; there is also, (as I have already shewn) a very great thinness of the *muscular* coat, at this place, which may equal, and sometimes exceed that of the former.

The instances which I have mentioned above, afford striking examples of thinness in the coats of the stomach at its great end; but that this thinness

* HUNTER's Observations on certain Parts of the Animal Œconomy, p. 226.

originated in erosion of the villous coat by the gastric juice, appears to me to be very doubtful; because it is difficult to conceive, how this effect could occur without being accompanied by an erosion of the ends of the arteries, and consequent extravasation on attempting to inject them: but yet in the cases which I have stated, where the substance of the stomach was in the extreme of thinness, no extravasation took place when the arteries were injected. In those cases likewise, the venous blood, on forcing it backwards, filled minute vessels, but was not extravasated.

I can hardly indeed conceive, that if the great end of the stomach were, in ordinary circumstances, eroded by the powers of the gastric juice, we should be able, with any degree of certainty (as we assuredly are), to fill its vessels by injection; unless we could suppose, that the vessels were left unaffected in the solvent operation. Mr. HUNTER was quite aware that the gastric juice, in diminishing the thickness of the villous coat, must digest the ends of vessels; for he gives as a proof of digestion of the stomach taking place, that blood, when forced from larger branches into smaller ones, passed out at the digested ends of vessels, and appeared like drops on the inner surface. Such a degree of digestion, however, must, I venture to suggest, be very rare; for in the many trials which I have made as to this point, particularly where the stomach was exceedingly thin, it has never hap-

pened to me to be able to do more, than fill the minute extremities of the veins, (in the way which I have already mentioned) by pressing the blood backwards in the larger branches. These minute extremities are easily ruptured, in injecting the veins; and if a sufficient body of blood could be forced back from the trunks into them, (which can scarcely be the case) it is most likely that the same effect would follow.

Mr. HUNTER seems to refer the vascular appearance, seen in the inner surface of the stomach, to thinness of the villous coat; meaning, I presume, to imply, that the vessels are generally in a state to be visible, provided a certain portion of the villous surface by which they are covered, or in which they are imbedded, were removed from them. This, however, does not appear to me to be the case; for the visibility of vessels, as far as I am able to judge, arises, in a considerable degree, from the accidental circumstance of blood being contained in them, without which, they would be difficultly seen at all*; and the possession of blood, seems to me to

* The term vessels, employed by Mr. HUNTER, can only apply to veins, the arteries being always empty, except perhaps in a portion of their trunks. If blood is not contained in the veins of the stomach, even the trunks of those veins are discovered with very great difficulty. The arteries may generally be traced by their size, while they run between the peritoneal and muscular coats, which is the first part of their course in the stomach; but in the small branches, they are seldom, in their usual state, to be seen or felt.

be in a great degree independent of the state of the coats as to thickness.

It by no means follows, because large veins are frequently seen ramifying under the villous coat of the great end of the stomach, (when this is thin, and therefore admits them to be seen through it) that a similar vascular appearance will be seen in other parts of that viscus, by dissecting off the whole, or a part only of the mucous coat which lines it.

The nature of that vascularity which is so generally seen in the villous coat of the stomach, seems to have been very much misunderstood among authors, even of high eminence.

HOFFMANN has a chapter entitled, " de inflam- " matione ventriculi frequentissima", in which he expresses his surprise, that a complaint so common, as he found inflammation of the stomach to be, should have been so little observed; and he points out as indications of this disease, appearances very similar to such as are mentioned in this paper, to be of usual occurrence *. He admits the existence of similar appearances, in plague and various fevers; but in the former, he attributes their occur-

* " In corporibus dissectis, ventriculus valde rubicundus, variis modo rubris, modo nigris maculis distinctus, vasaque sanguinea et capillaria multo sanguine turgida reperiuntur; quandoque orificium sinistrum macula lata nigra notatum visitur."— " Non totus vero ventriculus semper, sed pars saltem, maximè vero fundus, inflammatur." HOFFMANNI Opera, tom. 6, p. 224.

rence to a species of poisonous miasma, inhaled by the breath, which produces spasm, and by this means, inflammation of the stomach.

De Haen* and Stoll† give examples of what they regard to be inflammation of the stomach, terminating in gangrene, without having exhibited any of the usual symptoms of gastritis; and the former recommends this occurrence, as a very remarkable and puzzling one, to be added to his chapter of Problemata et Difficultates.

Selle, in his Pyretologia‡, refers to De Haen, as affording a modification of the usual definitions of gastritis; and Cullen seems also to have depended on the authority of the same author, when he states, "that it appears from dissections, that the stomach has often been affected with inflammation, when neither pain nor pyrexia had before given any notice of it §."

* "Nec minus mirabilis ventriculi, et obstructi, et perquam inflammati, et gangrænosi, contemplatio, ubi ad mortem ferè usque, nec signa febris, aut gangrænæ in pulsu, nec signa doloris in hoc viscere, nec signa alicujus in ejusdem functione defectus, apparuerint." De Haen's Ratio Medendi, pars 6, cap. 12, § 2.

† — "ventriculus ingens" —— "cujus posterior facies longè latèque ex inflammatione"—"rubebat"——— "En hic quoque ventriculum inflammatum, absque consuetis et manifestioribus inflammationis signis. Intestina livida, vel absque prægressa inflammatione fuerunt, vel prægressa est inflammatio absque ejusdem signis." Stoll's Ratio Medendi, tom. 3, p. 380.

‡ Selle's Rudimenta Pyretologiæ Methodicæ, p. 139.

§ Cullen's First Lines of the Practice of Physic, vol. i. p. 420.

PORTAL, in speaking of the great vascularity of the stomach, says, that by means of the slightest turgescence of the vessels of the stomach, particularly the veins, the villous coat becomes dark; an effect so common, that this black colour ought to be regarded as *a mark of inflammation*, rather than poison*.

FRANK states the frequency of inflammation of the stomach, and enumerates its symptoms; but he admits, that in many instances, where inflammation was found in the stomach after death, most of those symptoms were absent; in others, where the greater part of the symptoms were present, that no mark of inflammation was to be discovered on dissection; and in others, that a similar train of symptoms was removed, by means which were adverse to inflammatory complaints†.—I am like-

* PORTAL's Cours d'Anatomie Médicale, tom. 5, p. 164. He adds, "Dans quelques cadavres, on ne trouve ce viscère inflammé, *que dans quelques points*, comme vers le cardia, vers le pylore, souvent dans la grande courbure de ce viscere, ou ailleurs; d'autrefois les parois de l'estomac sont inflammées dans toute leur etendue." Tom. 5, p. 194.

† "Non infrequens stomachi humani morbus est *gastritis*, aut ejusdem inflammatio; cujus quidem signa principalia in febre acuta, in epigastrii tensione, ardore, dolore, in vomituritione, anxietate, singultu, ab assumptis quibusvis mox, et cum subitanea istorum rejectione, adauctis consistunt: sed in multis, qui ventriculi post mortem phlogosin obtulere, nunc plurima ex istis defuerunt; nunc, cum pars major symptomatum in ægrotante comparuisset, vel in cadavere inflammationis ad ventriculum

wise inclined to think, that vascularity of, and extravasation into, the villous coat of the stomach, as well as external vascularity of the intestines, particularly when these appearances are dark-coloured, have been occasionally described as inflammation or gangrene, even by MORGAGNI and LIEUTAUD, two of the highest authorities in pathology *.

HALLER also seems to regard fullness of vessels as a proof of inflammation; for he states, that he has so often, in his dissections, seen inflammation of the intestines present, as to consider such an affection as almost constant in every kind of fever,

triculum in vanum quærebantur vestigia; vel ab aliis causis dictorum effectuum pependerat cohors, ac a medendi methodo, inflammationis certe contraria, potuit dissipari."—FRANK (J.P.) *De curandis hominum morbis epitome*, lib. 2. p. 253.

* "Ventriculi fundus atro colore;" "ventriculus intus inflammatus, minimisque vasculis multum sanguine turgentibus;" "ex atro (ilii partes) rubebant, sanguiferis vasis, non secus ac post injectam coloratam ceram, manifestissimis," are examples of the mode of description frequent in Morgagni's valuable work.—In one instance, (epist. 29. art. 29.) the absence of pain in inflammation of the bowels, is attributed to a paralytic affection, which took off the sensibility of the parts; and from other cases MORGAGNI deduces the inference, that pain and fever are not necessary for the existence of inflammation of the intestines. His words are, (epist. 35. art. 21.) "Nec tamen, siquando alterum vel utrumque horum" (nempe vehementem dolorem, vel acutam febrem) "aut abesse, aut vix esse invenies, continuò putabis, aut nullam esse inflammationem, aut levem, aut gangrænam et sphacelum in eorum esse intestinis non posse, in quibus duo illa præcessisse non videris."

and frequent in every other complaint*. Numerous examples of the same opinion are to be found in other respectable authors.

The importance of distinguishing between darkness of colour, and proper inflammation, or its effects, was noticed at a very early period by HABICOT, a French surgeon of eminence in his time, who states, that persons are often deceived into a belief, that the dark colour produced by the gastro-epiploic vein, in the greater curvature of the stomach, is the effect of poison †.

* HALLER's Elementa Physiologiæ, tom. 7, p. 43.

Most of the cases of inflamed stomach noticed by LIEUTAUD, are taken from other authors. One of them (Historia Anatomica Medica, tom. i. p. 26, obs. 68.) is abridged from HALLER's Opera Minora, tom. 3, p. 295, and seems to me to shew how loosely inflammation of the stomach has been put down among diseased appearances. It is the case of a person, in whom, though there had been no affection of the stomach during life, that organ was found, on examination, to be universally inflamed, and blood effused into some parts of its cellular substance. The patient was a man of 50, who had recovered from an attack of pleurisy, but remained very liable to pectoral complaints. From exposure to cold, he was seized with a violent fever, with pain and oppression in the chest, which were followed by hiccup, delirium on the 8th day, and death on the 12th.—See some judicious observations on the differences between inflammation and vascular fullness in membranes, in HUNTER on the Blood, p. 281.

† " La partie intericure d'iceluy vẽtricule estãt nettoyée demõstrerez, tant la tunique interne qui est veloutee, & comme l'abontissemẽt qui se faict des vaisseaux provenãs de la vene gastre epiploïque en la partie gibbe dudict ventricule, le rend de couleur noirastre, qui a faict croire à beaucoup d'inexpers, en la medicine

The means of forming a satisfactory conclusion in cases of suspected poison, obviously connect themselves with the proofs, which dissection is capable of affording, of the existence of inflammation in the stomach during life. There are no circumstances under which medical men have a more serious and anxious responsibility, than in the examinations which they are called upon to make in such description of cases; for while, on the one hand, public justice demands from them an unequivocal avowal of the results of their judgment and experience, for the conviction of guilt; it is equally required, that their opinions should be founded on an accurate knowledge of what are the effects of natural causes on the human body, and what the consequences of deleterious operation. The most able and experienced men have found difficulties in making up their minds as to the necessary effects of poisons; and it would be highly important, both for the interests of the public, and the credit of the profession, that the means should be afforded of directing the judgment, in those de-

dicine & chirurgie, aux maladies violentes y avoir eu poison ou venosité en leur mort."—Habicot Nicolas, Semaine ou Practique Anatomique, p. 48, leçon 3, Paris 1610.

Boyer makes nearly a similar remark: "Le grand nombre de vaisseaux qui se distribuent dans cette tunique (la veloutée) lui donne souvent une couleur pourpré obscur; c'est a quoi il faut faire la plus grande attention lorsqu'on est chargé de faire l'examen des corps de personnes que l'on soupçonne mortes de poison."—Traité complet d'anatomie, tom. 4, p. 337.

licate and difficult problems, on which medical testimony is occasionally required in courts of justice*.

Authors on Forensic medicine have been too apt to generalize, without having had the benefit of studying, sufficiently, individual cases; and hence the effects of putrefaction, and the spontaneous changes which the loss of vitality produces on the human body, have, in descriptions, it is to be feared, been sometimes misunderstood, and sometimes confounded with the proper and necessary operation of poisons.

Some of the most respectable writers on this subject, have represented the effects produced by poisons on the stomach, œsophagus and intestines, to consist in diminished cohesion, inflammation, mortification, erosion, and perforation of those organs†: but later and more particular observa-

* I allude more particularly to the hesitation which Mr. HUNTER had, in the celebrated trial of CAPT. DONNELLAN, in distinguishing between the effects of poison, and the effects of putrefaction.

A report of this important trial was published by Mr. Gurney, at length, from the account taken by him in short hand. A full abstract is to be found in the Gentleman's Magazine for 1781, and in the London Chronicle for March of that year.

† Mais ce qu'il y a de constant dans les cadavres des personnes qui ont péri d'un poison âcre ou caustique, c'est de trouver l'œsophage, l'estomac et les intestins grêles atténués enflammés, gangrenés, rongés et souvent percés.

MAHON's Medicine Legale, tom. ii. p. 308.

PLENCK,

tion seems to evince, that the only morbid change which may be invariably expected, is inflammation; for the others are either occasional only in their occurrence, or equivocal in their nature; as in the case of mortification, or gangrene, which may be assumed to exist, from mere darkness of colour. Mortification and gangrene, are rare occurrences in either the stomach or the bowels; and they are not noticed by Dr. Baillie, in his Morbid Anatomy, as belonging to the usual effects of mineral poisons, nor by Mr. Brodie*, nor Dr. Jaegart, both of whom have attended very much to the operation of those substances.

Plenck, in his Toxicologia, page 13, says that we may distinguish when a person has been destroyed by poison, "si in tali cadavere ventriculus inflatus vel spasmodicè contractus, aut inflammatus, vel gangrænosus, vel saltem maculatus inveniatur, absque alia prægressi prius morbi causa."

Dr. Parr states, that when "stimulant poisons have been the cause of death, the abdomen is greatly inflated, becomes rapidly putrid, dark spots appear on the body, erosion, inflammation and gangrene are found in the fauces and stomach, the blood is black, and collected in the veins; above all, the villous coat of the stomach is destroyed."

Medical Dictionary, art. Medicina Forensis et Politica.

* Further experiments and observations on the action of poisons on the animal system.

Philosophical Transactions for 1812, part ii. p. 210.

† Dissertatio Inauguralis de effectibus arsenici in varios organismos, necnon de indiciis quibusdam veneficii ab arsenici illati.

Edinburgh Medical and Surgical Journal, Jan. 1811, vol. vii.

I may add, that in a case of poison by arsenic, which I saw some years ago, there was no diminution of natural tenacity, which is the only certain test of a part being mortified; and no circumstance from which gangrene could be inferred, but the very insufficient one of darkness of colour *.

Neither is the disposition to putrefy, in such cases, materially different (as is generally imagined) from what it is in ordinary circumstances: and that erosions very rarely happen, and are sometimes liable to be suspected, when they do not exist, is rendered probable, by the consideration of the facts brought forward by the two last named gentlemen.

But if it be admitted, that the only constant and necessary primary effect of mineral poisons on the human stomach, is the production of inflammation, it is important to inquire, whether such appearances of inflammation are so distinctly and unequivocally marked, as to be readily distinguishable from mere vascular fullness, or slight extravasation, as described in this paper?

* Case published in the Edinburgh Medical and Surgical Journal for October, 1809. It is remarkable that in this case, there was reason to suppose, that the patient had suffered little or no pain,—and in the only example which Dr. JAEGAR saw of death by arsenic, in the human subject, there was no complaint of pain, even when the patient was asked about it.

To this question, I fear, that an answer, which is completely satisfactory, cannot at present be given.

Dr. BAILLIE states, that in inflammation of the stomach, that organ is "a little thicker at the inflamed part, the inner membrane is very red, from the number of small florid vessels, and there are frequent spots of extravasated blood, which appearances are more intense, when arsenic has been swallowed." With this account, Mr. BRODIE's observations, in considerable measure agree.

In a dog which had taken several grains of corrosive sublimate, and which was destroyed a few hours afterwards, for the purpose of observing what might be regarded as appearances of recent inflammation in its stomach, the following were the principal circumstances remarked*.

That part of the stomach which extended from the cardia, about an inch and a half along the lesser curvature, and about three parts of an inch in every other direction, together with a few other portions of a very small extent, possessed a pretty deep

* This dog I examined with Mr. Lawrence, Assistant Surgeon to St. Bartholomew's Hospital. The dog had vomited considerably. He was directed to be destroyed by a blow on the head, instead of by suspension, which would have affected the appearances, by producing unusual accumulation in the veins.

crimson hue; while the pyloric portion was of a light straw colour, and the other parts of a greyish pink. The crimson colour, though deeper, had, in other respects, very much the character of what was mentioned in the note to page 393; but it was mixed with darker coloured patches, which seemed, on inspection, to consist of coagulated effusion, or coloured coagulum, in the substance of the villous coat, very similar to that which is sometimes found in an inflamed serous membrane, on which coagulable lymph had been very recently deposited. The plicæ were numerous and firm; there was little external vascularity; and below the villous coat, there were some minute veins perceptible, (particularly where the coat was reddest) which could not however be traced into its substance.

Immersion in water removed part of the general redness; but that of the dark patches remained, with little change, till putrefaction commenced.

The villous coat of the intestines had occasional patches of light crimson efflorescence.

I thought that it might be agreeable to the Society for me to annex a coloured drawing of what seemed to be the effects of inflammation in a portion of the stomach of this dog, by way of comparison with the healthy appearances before described. I have accordingly done so; but I can

hardly offer this, either as an example of a well marked difference between mere vascularity and inflammation in a part; or as an instance of the appearance which inflammation would make in the human stomach; because in the latter, the villous coat is much less firm, and therefore much more disposed to venous accumulation, than in the former. This is distinctly evinced by the difference which occurs between the stomach of any of the malefactors, whose cases are given above, and that of a dog which has been hanged. In the latter (as I have already observed) there is generally a very slight pink tinge only, over the whole inner surface, divisible however into minute points; while in the former, there are well defined vessels universally diffused.

It is highly important that appearances of inflammation in the stomach should be correctly distinguishable, after death, from those of mere vascular turgescence; but it does not appear to me, that the discrimination can at present be made with sufficient precision.—The following observations, I take the liberty to offer, as suggestions relative to this subject.

When the stomach is inflamed, coagulable lymph is occasionally thrown out in the substance of the villous coat, or upon its surface; and this, when it occurs, (which I believe to be but rarely the case) is perhaps one of the least equivo-

cal indications of previous inflammatory action. But thick mucus sometimes assumes a good deal the appearance of coagulable lymph; and the existence of a coloured coagulum, may occasionally be confounded with a coagulated portion of extravasated blood, adhering (as in the case of Nicholson) to the villous coat; which may the more readily occur, when the former is not in quantity, sufficiently great, to produce well marked thickening. It is also to be observed, that in cases where mineral poisons have been given, the deleterious operation (as appears from the experiments of Mr. Brodie) is generally upon the brain and nervous system; and in this case the inflammation produced on the stomach itself, may be short of that which would produce effusion of lymph.

It is exceedingly likely, that in inflammation of the stomach, the redness is less distinctly referable to vessels, and the florid colour more permanent, than in mere turgescence: but it is not to be forgotten, that it sometimes happens in cases of natural death, that the vascularity of that organ is partly florid and distinct, and partly diffused; circumstances which may create a little embarrassment, when they are to be considered with reference to a certain supposed cause.

In every case of death from poison, the appearances which dissection may offer, must be modi-

fied by the state of the blood-vessels after death, and by the very vascular nature of the stomach, and the disposition to accumulation in its veins, which occurs at the close of life. We may therefore not unreasonably expect such venous accumulation, to be often superadded to the proper and necessary effects of inflammation.

If well marked erosions were the frequent effects of severe inflammations, they would materially assist in forming a ground of discrimination. As Mr. Brodie and Dr. Jaegar, however, represent erosions to be very uncommon effects of arsenic, it is important that the frequent thinness of the fundus of the stomach, and the occasional inequalities of the villous coat, either there, or in other parts of that viscus, should not be mistaken for them. These inequalities are by no means unfrequent, and I have often seen them to a considerable degree, where they were unquestionably mere peculiarities of structure.

In judging of the existence of external inflammation in the living body, it is not by mere redness, or by turgescence of vessels, that the opinion is guided; but by those circumstances, in conjunction principally with pain, heat and swelling. It does not therefore appear to be less necessary, for the purpose of enabling us to judge of the existence of internal inflammation, that something unequivocal in the symptoms should be superadded to the

appearances submitted to our consideration, than that there should be assistance required in judging of external affections, in addition to mere colour or vascularity.

But on the subject of symptoms, it is important to recollect, not only that genuine gastritis is extremely rare, but that affections of some neighbouring parts, which may sympathize much with the stomach, may be confounded with original affections of the stomach itself. This organ, too, is liable to many very painful or uncomfortable sensations, which there is no reason to consider as marking it with any particular character of disease.

In offering these remarks, I may, perhaps, be regarded as having somewhat aggravated the difficulty of forming a judgment, after death, as to the existence of inflammation of the stomach during life. It does not appear to me, however, that I have done so; and I should be happy, if, by calling the attention of professional men to the subject, a more correct, and more practical diagnosis should be established, than is at present possessed, relative to the operation of inflammation in that organ, from whatever cause it may have proceeded.

Before I conclude this paper, it is necessary

that I should advert to the appearances of inflammation, which are generally stated to be found in the stomachs of hydrophobic patients, and which have been, by many, thought to prove that hydrophobia is a species of gastritis.

I have seen five cases of hydrophobia, and have been present at the dissection of three of them; but I am unable to say, that there was any palpable difference, between the vascular appearance of the villous coat of the stomach in those cases, and that which is ordinarily seen, in the human subject, where there was no affection of the stomach during life.

In some of the cases which are upon record, the stomach is stated to have been entirely free from disease*; and most of the other examples to be found in authors, particularly those which are published in the Memoirs of the Royal Society of Medicine of Paris for 1783, and by Dr. Hunter, in the 1st volume of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, afford no appearances in that viscus, which are not referable to fullness of vessels only.

* See VAUGHAN's Cases and Observations on Hydrophobia, Cases 1st and 3d.—Also two cases by Dr. BABINGTON, the first in Medical Communications, vol. I. p. 215; the second in Medical Records and Researches, p. 117; and several cases quoted in Hamilton's Work on Hydrophobia.

The appearances observed in the stomach of the dog, are rather more diversified. The principal number of cases reported, exhibit marks of redness and fullness, or slight extravasations of various extent, in the villous coat; but there are some mentioned, where this coat presented nothing morbid in its aspect*.

When we compare the descriptions given of the state of the stomach, in most of the cases of hydrophobia recorded as occurring in the human subject (for I do not take into account any extraordinary, or anomalous cases) with the series of dissections presented in this paper, the resemblances are striking, and certainly tend to throw some degree of doubt on the idea very commonly entertained, that the usual vascular appearance observed in hydrophobic stomachs, is inflammation; and that it is connected with the production of the symptoms which existed during life. It is very difficult to conceive, that the cause of one of the most formidable and distressing maladies of the human body, can be such an affection of a part, as is, in many cases, so slight, as not to be an object of attention or remark at all; and in most, does not exceed what is very generally met with, where no symptoms, referable to disease of the stomach, or spasmodic affection of the œsophagus or pharynx, were present.

* Gilman's Dissertation on the Bite of a Rabid Animal, sect. I. &c. &c.

The appearances mentioned in some of the dissections given of dogs, deviate more from the character of simple turgescence, than most of those stated to have been observed in the human subject; inasmuch as there was frequently effusion of blood seen between the villous and muscular coat of the stomach, or in the substance of the former. The mere action of vomiting will, however, as I have in one case particularly observed, materially increase the redness to be seen, after death, in the stomach of a healthy dog. In attempting, therefore, to establish the pathology of this disease, it is important to discriminate between the effects of inflammation, and the influence which the violent spasmodic affection of the œsophagus and pharynx will have, not only upon the mucous membrane covering those parts, but upon the villous coat of the stomach itself, by being propagated downwards within the cardiac orifice. For it is very probable, that violent spasmodic action of muscles, may produce a well marked influence on a superincumbent mucous coat, particularly when such coat is extremely lax and vascular, as is that of the stomach.

With regard to the employment of blood-letting in hydrophobia, I would observe, that if its utility were even confirmed by the most irrefragable evidence, it would not be conclusive as to the inflammatory nature of this disease. The effects of this remedy are not to be limited to the mere re-

moval of inflammation, or inflammatory disposition. It is not employed with this view in apoplexy, where it is often of the most decided benefit; and there may be effects produced in the body, particularly on the nervous system, by the copious abstraction of blood, for which the present state of pathological knowledge is not qualified to account.

AN ACCOUNT

OF THE

ANASTOMOSIS OF THE ARTERIES

AT THE GROIN.

BY ASTLEY COOPER, Esq. F.R.S.

SURGEON TO GUY'S HOSPITAL.

Read July 13, 1813.

IN a paper which I had formerly the honour of reading to this Society, I endeavoured to describe the course of the new channels for the blood, when the femoral artery has been obliterated by the operation for popliteal aneurism. Since that period I have had an opportunity of dissecting two persons in whom the iliac artery had been tied; and, as one of these had survived the operation a much longer time than the other, an opportunity was given, not only of seeing the blood-vessels, when the course of the blood is established, but also of tracing the gradual progress of the new circulation.

Hypothesis would lead to a belief that anastomosing vessels would be numerous in proportion to the time which had elapsed from the operation, but the reverse of this is the fact, for at first many vessels convey the blood originally conducted by

the principal artery; but gradually the number of these channels becomes diminished, and, after a length of time, a few vessels conveniently situated for the new circulation, are becoming so much enlarged as to be capable of conveying an equal portion of blood to that which passed through the original trunk.

In examining, therefore, the two limbs, which I have the honour of shewing to the Society, many more anastomosing vessels are enlarged in that which had been recently the subject of the operation, than in the limb on which the operation had been performed for more than two years, a circumstance which has not arisen from a more successful injection, as the one had been as well injected as the other.

It may be further observed, that a person who has his iliac artery tied for an aneurism of the groin, recovers the use of the limb much more quickly than when the aneurism is situated in the middle of the thigh, for in the inguinal aneurism the principal anastomosing vessels are left free from pressure, but the femoral aneurism is buried so deeply in the muscles of the thigh, that the branches of the arteria profunda are compressed and the passage of the blood to the lower part of the limb is impeded.

In about six weeks from the operation in the

former case, the patient is able to make use of the limb, but in the latter the muscles of the leg and foot will be some months before they recover their powers, requiring the absorption of the aneurismal contents, and the consequent removal of the pressure upon the nerves and vessels.

This observation, however, applies principally to large aneurisms, on which account it is desirable in femoral aneurism; if not, indeed, in all others, to perform the operation in an early state of the disease.

One of these cases was that of a man of the name of Garrett Riley, who was a patient in Guy's Hospital, and had his iliac artery tied on the 14th of February, 1811; this man died ten weeks and six days after the operation, in consequence of the bursting of an aneurism at the bifurcation of the aorta; he was sitting, as I was informed, by his dresser, Mr. Barraud, in the square of the Hospital, when he suddenly fainted; he was taken into his ward, and in a few minutes afterwards expired.

Upon inspection of his body, beside the aneurism at the bifurcation which had burst, five aneurismal swellings will be seen in the limb, which I have now the honour to exhibit to the Society, one at the origin of the arteria profunda in the groin, a second in the middle of the thigh where the artery pierces the tendon of the triceps, which

aneurism was of large size, and was that for which the operation was performed; a third aneurism was placed in the ham, and between the popliteal and femoral there were two smaller aneurisms.

This man was a bricklayer's labourer, and the great exertions he had made in carrying loads up ladders, was, in his mind, the cause of the disease. Upon endeavouring to ascertain the mode in which the blood took its course through the limb, it was found that the femoral, tibial and fibular arteries were still open, and that the blood was conveyed into the femoral artery by the following anastomoses: The internal pudendal artery formed several large branches upon the side of the bulb of the penis, and these branches freely communicating with the external pudendal artery, had determined the blood into that artery, and by this channel into the femoral; the lateral sacral artery also sent a branch on the iliacus internus muscle, into the femoral artery, and the ilio lumbar artery freely communicated with the circumflex ilii, so that by these three routes, the blood found direct ingress to the femoral artery.

Numerous branches of arteries also passed from the lateral sacral to the obturator and epigastric arteries, the obturator in this case having its origin from the epigastric.

Beside these arteries a free communication existed between the arteria profunda and circumflex arteries with the branches of the internal iliac; first, the gluteal artery sent a branch under the gluteus medius muscle to the external circumflex artery; secondly, the ischiatic artery gave two sets of branches of communication, one upon the gluteus maximus muscle to the arteria profunda, and another upon the sciatic nerve to the internal circumflex artery; the internal pudendal artery also sent a branch of communication to the internal circumflex; lastly, the obturator freely communicated with the internal circumflex.

These then are the channels for the blood in an early date from the operation, but at more remote periods, as the anastomosing branches become larger, they are less numerous, and the description of their course is much more simple.

The second case was that of James Nutter, aged 37, who had the operation of tying the iliac artery performed on the 24th August, 1810, on account of a large femoral aneurism above the tendon of the triceps. This man survived the operation nearly three years, and dying in Guy's Hospital, I had an opportunity of examining his body, and of learning the condition of the parts which had been the subject of the operation. The external iliac and the femoral arteries were

obliterated, excepting about an inch of the femoral artery just below Poupart's ligament, which still remained open, and continued to convey a portion of the blood, but below this part it had become simply a ligamentous chord. The internal iliac artery sent first a very large artery of communication to the epigastric and obturator artery, so that the epigastric was supplied with blood from the internal iliac: secondly, the internal iliac sent an artery of communication upon the sciatic nerve, to the internal circumflex artery. The gluteal artery, gave a large branch to the origin of the profunda: lastly, the internal pudendal artery largely anastomosed with the obturator: the obturator, therefore, sprang in this case from two new sources, viz. from the internal iliac and from the internal pudendal artery, and the obturator thus formed, sent two branches of communication to the internal circumflex artery. The arteria profunda was in this case supplied from two sources directly from the gluteal, and more indirectly from the internal circumflex by the obturator and ischiatic arteries. The external iliac artery was obliterated to the origin of the internal iliac as other arteries usually are when ligatures are made upon them to the first large anastomosing vessel*. The principal

* I have been informed that Mr. George Bell, of Edinburgh, has a preparation of a limb, in which he had divided the femoral artery for popliteal aneurism, and that the obliteration of the artery has not extended to the arteria profunda as usually happens.

agents then of the new circulation are the gluteal artery with the external circumflex, the obturator artery with the internal circumflex, and the ischiatic with the arteria profunda, and the obturator artery is supplied with blood principally by the internal pudendal when the obturator arises from the epigastric artery.

The iliac artery has now been so frequently tied for aneurism of the femoral artery at the groin, that no useful purpose can result from the narrative of a case of that kind, offering no uncommon circumstances. In Mr. Abernethy's works, and in a book published by Mr. Freer, the first and best histories of this operation are given. But in the two following cases the disease had proceeded to an extent to make the probability of success but small, and the result will shew that the operation may be successfully performed under the most adverse circumstances.

William Cowles, aged 37, came to London from Beccles, in Suffolk, on account of an aneurism in the right groin, which he attributed to his having walked five miles with a heavy burden upon his back six months ago, and a fortnight before the appearance of the aneurism. Journeying to London upon the top of a coach, a distance of more than one hundred miles, he fell asleep upon his

face, and pressing upon the tumour, he observed its surface changed to a gangrenous colour. When he was admitted into Guy's Hospital, the skin was purple in some parts, red in others, and extremely thin. It was obvious no time was to be lost, and the operation was performed upon the day of his admission, viz. the 22d of June, 1808, two ligatures were made upon the iliac artery, and the vessel divided between them.

Nothing unusual occurred until the 30th of June, at ten o'clock at night, when a discharge of dark coloured blood took place from the aneurismal sac, and the swelling became quite flaccid. I ordered a sponge dipped in vinegar and water to be applied upon the swelling.

In the six following days the skin from the surface of the sac sloughed, so that the aneurismal cavity was completely opened. July the 8th the upper ligature separated, and on the 9th the lower came away.

The wound then looked well, the aneurismal sac granulated; but the man's health beginning to fail, it was necessary to remove him about a mile out of London, where he gradually recovered. This man, who now resides in the neighbourhood of Beccles, was in London this year, 1813, perfectly well.

CASE II.

April 30, 1813.

William Martin, aged 27, was admitted into Guy's Hospital under the care of Mr. Forster, for a fracture of the olecranon, and after having been in the hospital three weeks, he requested his dresser (Mr. Johnson) to examine a swelling in the left groin, which proved a femoral aneurism, seated at a small distance below Poupart's ligament, and the integument over it was in a mortified state, being of a dark colour, and having three vesicles upon its surface.

As it was thought that an operation was immediately necessary, and Mr. Forster was not at the hospital, I was requested to see him. The man said that the swelling had been growing nearly twelve months, and had a pulsation when he first observed it. He attributed its commencement to an attempt to raise $3\frac{1}{2}$ cwt. about three weeks before he first observed it.

The mortified state in which it was he attributed to walking the distance of four miles three days before it was shewn to his dresser.

The tumour was as large as an orange; the pulsation in it very strong; its most projecting

part was livid, and the surrounding parts of a deep red colour.

It appeared to me that no time was to be lost, and I immediately proceeded to tie the iliac artery. It may not be improper to remark, that the incision which I make for this purpose, is different to that usually advised; for I begin it just above the abdominal ring, and carry it half an inch above Poupart's ligament, in a semilunar direction to one inch upon the inner side of the anterior and superior spinous process of the ilium.

Two ligatures were applied upon the artery, and the vessel divided between them.

The ligatures separated on the 17th day.

On the 23d day after the operation, an incision was made into the aneurism, through the eschar, and the coagulated blood was discharged: the opening from the artery into the sac was very visible, but there was no bleeding from it.

The wound continued in a sloughy state for about three weeks, and then began to granulate; and although the restorative process went on slowly, the man was, after several weeks, discharged from the Hospital, completely cured, no lameness remaining.

OBSERVATIONS

UPON THE

LIGATURE OF ARTERIES,

AND THE

CAUSES OF SECONDARY HEMORRHAGE;

WITH A

SUGGESTION OF A NEW METHOD OF EMPLOYING THE LIGATURE IN CASES OF ANEURISM.

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THE adhesive inflammation is the primary resource of nature under local injury. It is employed in doing the repairs of the fabric which the other modes of inflammatory action secretly undermine or openly destroy. Suppuration and ulceration are invariably actions of destruction, when uncontrolled by the process of adhesion. This fact is strikingly exemplified in abscesses of the viscera which open externally, and in sloughs of the

intestine *per anum*, as I had lately occasion to shew in detail*. The single tube of the intestine after division or loss of substance is united, and forms a perfect tube again; that of the artery is obliterated: for the faculty of adhesive inflammation, upon which both phænomena depend, resides in the opposite surfaces of these canals, and coagulable lymph, which coats over the tied bowel, seals up the tied artery.

Before this adhesive inflammation was understood, surgeons attributed its proper results to other causes. The obliteration of an artery included in a ligature was supposed to be caused by the coagulation of the blood in the vessel: and as the existence of a coagulum of blood depended upon the exclusion of a portion of it from the circulation, if the ligature was placed in the vicinity of a large branch, the coagulum was not formed, and hemorrhage was inevitable. This was the doctrine recently taught in our schools, and illustrated by preparations; which however illustrate other points that might more accurately explain them.

The permanent obliteration of an artery can only be effected by an inflammatory adhesion of its internal surfaces. The adhesive inflammation of the

* See "An Inquiry into the Process of Nature in repairing Injuries of the Intestines, illustrating the treatment of penetrating wounds and strangulated Hernia." London, 1812.

internal or cuticular coat of arteries is sometimes but rarely spontaneous; it is excitable in this as in other parts by pressure and by wound.

1. I have seen the aorta just below its curvature, and in another subject a little above its bifurcation, partially filled by pure lymph, without any aneurismal tendency.

2. The obliteration of an artery by pressure is a more frequent occurrence, as in the natural cures of aneurism and in those effected by art. I have a preparation shewing the total obliteration of the right subclavian artery by an aneurism of the arch of the aorta. Mr. Blount informs me that he lately saw an aneurism of the thigh, under the care of Mons. Dubois in Paris, cured by steady pressure upon the vessel continued for twenty-four hours. It is not to my purpose to quote or relate cases, because these facts are familiar.

3. It was discovered by the celebrated Desault, that a round ligature drawn tight upon an artery made a clean cut of its internal coat, and the experiments of Jones, devised and executed with equal felicity, have established that the obliteration of an artery tied with a round ligature, is only the cicatrization of this cut. To ascertain with precision the effects of ligatures of various sizes, both flat and round, I have repeatedly examined the appearances left upon the cuticular coat of the

artery after applying them, and the following is a report of such experiments upon the carotid, iliac, and femoral arteries of the human subject.

Broad Tape -	No distinct impression, but a general longitudinal puckering or 'froncement,' as the French term it, of the internal coat, especially opposite the knot.
Narrower Do. Do. - -	
Narrow Tape -	The same, with partial laceration.
Narrower Do. Do. - -	Cuts with a fretted edge, or partly cuts and partly tears.
Flat Bobbin -	The same.
Large Round Do. - -	Cuts cleaner.
Twist - - - - -	Clean and narrow incision.
Twine - - - - -	
A round ligature including a sheath of linen upon the artery - - - - - -	Faint, but distinct incision.
Do. including a cylinder of quill, wood, or other firm substance - - - -	Deep, but somewhat partial incision.

From these observations it appears that the flat ligature, as it is diminished in breadth, and admits of being more strictly applied, *i. e.* as it approaches to the form and size of the round ligature, imitates its operation, but fails to produce a simple incised wound, which every body knows is the wound best disposed to unite by adhesion. The inclusion of substances soft or hard in the round ligature does not materially alter its effect.

It being established that the internal coat of an

artery is prone to take on the adhesive inflammation, and that it is only by virtue of this inflammation that the vessel can be permanently obliterated, it is not a question of difficult solution, whether the mere apposition of sound surfaces, the apposition of bruised and lacerated surfaces, or the apposition of fresh cut surfaces is the condition most favourable to union. What is the result of our familiar observation in practice, of the comparative efficacy of pressure, of bruising and tearing, and of cutting, to excite adhesive inflammation? The obliteration of a hernial sac under the pressure of a truss, of an artery overlaid by a heavy tumour, and in general the cementing of entire surfaces is a chronic process. Contused and lacerated wounds oftener suppurate or even slough, than kindly take on the adhesive inflammation. Surgeons anxious to procure a rapid union of parts, incise them for that purpose, as in the hare lip. The severe operation for hydrocele by incision rarely fails of its object.

It is curious to observe the revolution which has taken place within a few years in this branch of surgical practice, since experimental inquiry has furnished the true explanation of the principle upon which the ligature acts.

Mr. Hunter and the surgeons who after him practised the operation for the popliteal aneurism, were in the habit of applying the ligature with

force only sufficient to bring the sides of the vessel in contact; and some included an extraneous body, as a piece of cork or wood, or a roll of linen, to prevent the lesion of the artery in the act of tightening the ligature. The fear of cutting the coats of the vessel was uppermost in the minds of all, and next to this, the fear of quickening the process of ulceration, and the casting off of the ligature. Scarpa, Richerand, and the other eminent surgeons of the continent are still fettered by these fears. But we see that they are groundless; that, on the contrary, the security and effect of the ligature are ensured by its cutting the middle and internal coats, which it does without danger to the outer, however applied; and that retarding the process of ulceration when the ligature has done its duty, is not only useless but mischievous, as it increases the danger of secondary hemorrhage.

Jones, whose scientific and comprehensive view of this important branch of surgery*, must excite universal regret for his loss and respect for his memory, ascertained, that the effusion of lymph from the wound inflicted by the ligature was sufficient, even if the ligature were removed upon the instant, to obstruct the artery. By including a loose

* See "A Treatise on the process employed by Nature in suppressing the hemorrhage from divided and punctured Arteries, and on the use of the ligature, with observations on secondary hemorrhage." London, 1802.

thread along with the artery in the ligature, he readily withdrew the latter after the infliction of the wound. In one instance he succeeded with a single ligature, and in several instances with two, three, or four, made at a small distance apart. The lymph effused was in proportion to the extent of the section, or if this was incomplete, the union was equally so. He was led to conclude that the complete circular section of the internal coat was indispensable to union, and, the success which attended his experiments led him to conjecture, that in some surgical cases removing the ligature as soon as it was made would be an efficient operation. This suggestion, the value of which he left to be determined by future experimenters*, was caught at with eagerness by his readers, and by many considered to be the essence of his publication. It required little sagacity to discover the advantages which would result to practice, if it could be shewn that the effect of the ligature which heretofore required fifteen or twenty days, could be attained with equal certainty in little more than as many seconds. But just as was this calculation in theory, it was not yet realized in practice, and the fact was chiefly valuable as it afforded con-

* "I leave the fact (viz. the complete obstruction of an artery consequent upon the momentary application of a ligature) for those who have opportunities of applying it in practice, when all the circumstances which determine its success or failure shall have been fully ascertained by further experiments on brutes." Jones on Hemorrhage, p. 136.

clusive evidence of the principle which he had established, viz. that the obliteration of an artery was effected by the adhesive inflammation. For if the disposition of the cuticular coat to effuse lymph was such, that in some cases the mere wound, setting aside apposition of its edges, the condition commonly necessary to union, was sufficient to produce it, *a fortiori* the wound of which the sides were kept in contact would in all cases unite and by the same medium. But the result of these experiments neither warranted the conclusion that the complete incision of the internal coat was necessary to union, nor that union was a necessary consequence of such an incision. The history of the broad tape or ribband ligature proves that contact without wound will sometimes produce adhesion, and the frequent repetition of Jones's experiment has proved, that wound without contact will often fail to produce it. Among others Mr. Dalrymple, surgeon, of Norwich, has decided the latter point by many trials. He informs me, that he " has repeated the second experiment of Dr. Jones's third chapter, of which the results are represented in his eleventh plate, not fewer than seven times on the horse, and three times on the sheep; and that in every instance he has failed to obtain his results. Not only has no coagulum been formed; but even where the subject of the experiment has been suffered to live until the thirteenth, fifteenth, or eighteenth day after the operation, the canal of the artery has not been found obliterated. In

every instance, indeed, its calibre has been contracted; still however it has remained pervious in degree and capable of transmitting a lessened column of blood." The results of these experiments collectively, lead Mr. Dalrymple to the conclusion "that the internal and middle coats of an artery may be divided, the external tunic remaining uninjured, without being followed by the formation of a coagulum, or the obliteration of its canal." I am a good deal surprised at this notable difference in the results obtained by two experimenters of so much accuracy and discernment. To the presence or absence of the coagulum of blood no primary importance attaches, as it is a consequence only of the obliteration of the canal, and of that not always. The contraction of the vessel, contraction being invariably the concomitant of cicatrization, must always be the consequence of a wound of its coats. And the stated difference of result between the case in which the ligature is taken off the vessel and that in which it remains upon it, I should explain thus: in the former, union takes place between the edges of the severed coat side by side (contraction), while in the latter it takes place between the opposite sides (obliteration).

The original experiment of Jones, in whatever light we view it, is of unquestionable importance, and deserves to be highly appreciated. While its occasional failure demonstrates that the apposition of the cut surfaces is essential to the certain obli-

teration of the vessel, its occasional success establishes that, *cæteris paribus*, it cannot with this precaution fail of its intention. And although uncertainty of result may preclude its application to practical surgery, I should little question its efficacy as a remedy for the aneurism, whether it simply diminished or totally arrested the column of blood, since the only theory of cure in this disease, obvious to my mind, is the diminution of the blood's impulse in the diseased and resistless artery. And here I cannot help observing of what vast importance it is to the progress of science, to register facts of which the use is at present imperceptible or at most indistinct, as beacons for future travellers on the same road. If we reflect how many discoveries have been the creatures of accident, and how few have been led up to and perfected by one and the same mind, it will not appear unfair to conclude that some may have been obscured and others lost, from a too light estimation, or a wilful disregard of these indirect aids and clues to knowledge.

From what has been said of the experiment of Jones, it will be understood that it is evidence over and above what was required, to prove that the wound of an artery is united by the same process as a wound of the skin, but that like this the wounded surfaces require to be supported in contact.

II. It would be well if a surgeon, before tying up the main artery of a limb, were to turn in his mind the series of changes of which this operation is the commencement, the nature and relation of these changes to each other, and the degree in which they may be influenced by the form of the ligature and the mode of applying it.

First, the internal coat is to be excited to an inflammation sufficient for the *vasa vasorum*, as they are called, to pour out lymph, by which the part of the artery adjoining the ligature becomes thickened, and being contracted in the form of a cone, is united at its apex. Within twenty-four hours this process should be considerably advanced, for at this early period begins the ulceration of the exterior tunic in consequence of the pressure of the ligature. The time required for its liberation varies according to the perfect or imperfect application of the ligature. In the arteries of the dog which are much smaller than the human, ulceration is generally completed in six days. I pass over the clot of blood because its presence is accidental, though not always unimportant: the gradual obliteration of the old and the enlargement of the new channels of circulation, because these are indirect consequences of the obstruction which do not affect the security of the ligature; but there are direct changes to take place external to the artery. The capillaries of the wounded cellular membrane must assume the healing or adhesive action, and

exude their lymph over and around the artery and into the cells of the membrane surrounding it, so that the ends of the vessel may be covered by lymph and the wound be in part filled by it in six hours. Soon this lymph becomes organized, having a red and granulated appearance; it goes on increasing in thickness until it completely envelopes the vessel, and becomes so firmly compacted therewith as to make its extremities indistinguishable*. After all this, after the severed vessel is thus carefully protected and fortified by a solid bed of lymph, and the wound is on the point of healing, a passage for the ligature is to be ulcerated through the lymph, and if unluckily the wound has closed over the ligature, an abscess must be formed to discharge it†. This is an outline of the changes which are required to ensue, and in the failure of one or other of them, the loss of a link in the chain, we may discover a cause of secondary hemorrhage.

First, the inflammation of the cuticular coat of the artery may be deficient, or not a pure adhesive inflammation, and no healthy lymph be effused. This may arise from the debility of a constitution worn out by disease, from a morbid change in the texture of the vessel, as a deposition of earthy matter in its coats, or a pre-existing erythematous state of the internal tunic; or it may be owing to

* See Fig. 4. Plate 7.

† See Mr. Hunter's first case in the "Transactions of a Society for the improvement of Medical and Chirurgical Knowledge."

the use of a ligature which simply approximates the sides of the vessel, or of one which fritters the cuticular coat to rags instead of simply dividing it. Unhappily neither of these causes will bar the ulcerative inflammation; they will rather predispose to it, and to such a condition of it as will not be bounded by the ligature*. But should the ulcerative absorption be completed at any point of the cylinder, and no union have taken place, the only security against secondary hemorrhage will be derived from the casual existence and extent of the internal clot of blood.

Secondly, the adhesive action within the vessel may have been healthy and the union of its sides completed at a sufficiently early period, but the muscular parts in the vicinity of the artery having been extensively and rudely torn asunder by the operator's fingers in searching for it, a large portion of it denuded of its sheath in placing the ligature upon it, and perhaps all this violence committed upon a half hectic subject, sinuses are formed upward and downward in the course of the artery†. Here the ulcerative action is undefined by the adhesive. The matter lodges about the artery and dissects the muscles far beyond the limits of the wound, and there is much reason to fear that the

* Mr. Home's case of Mr. Marshal, ibid. vol. II.

† Mr. Hunter's 2d case. Mr. Birch's and Mr. Cline's cases, ibid. vol. I.

ulcerative absorption by which the ligature is discharged, instead of being confined to the circle of the ligature, will extend upon the parietes, partially as they are defended by coagulable lymph, and destroy this lymph, together with the newly cicatrized extremities. In this way secondary hemorrhage is produced in stumps that ulcerate deeply after amputation, and in abscesses in the vicinity of large arteries. I must remind the reader that the spontaneous steps of nature, in the suppression of hemorrhage from wounded arteries, differ only in the outset from those which follow the employment of the ligature. The blood extravasated into the sheath of the wounded vessel does the office of the ligature; *i. e.* it forms the temporary barrier until the coagulable lymph is effused under the adhesive inflammation which constitutes the permanent one. This analogy premised, I shall here relate a remarkable case of a wounded femoral artery, to shew how the lymph which seals the vessel being destroyed by ulceration in common with other parts, this admirable resource of Nature is cut off.

CASE.

Ann Mould was brought into Guy's Hospital on the 2d of December, 1811, intoxicated. She had been run over by a coach. The wheel had passed over the lower and back part of both her thighs.

A small deep wound was found in the ham, from which there was a free hemorrhage, to appearance venous. The wound was dilated but no bleeding vessel discovered; it was dressed and a gentle pressure applied. From the swollen state of the limb it was thought right to keep up evaporation from the surface. It was evident for some days after the accident that an internal hemorrhage was going on, and the blood extravasating between the flexor muscles on the thigh. The integuments of the whole limb became distended and the wound turned sloughy. Fomentations and poultices were applied; an ichorous and bloody matter issued from the wound, and the swelling of the limb was somewhat diminished. On the 14th of December the wound had assumed a much healthier appearance, and things seemed fair for recovery.

On the 17th at ten o'clock at night, Mr. La Serre was called to his patient on account of so profuse a bleeding from the femoral artery, that he found her dying upon his arrival at her bedside.

Dissection. A large ulcerated cavity containing blood and pus was found between the muscles which form the hamstrings. The femoral artery had been completely divided, its extremities retracted and thrown out of their relative situation. It was plain that the artery had been severed, for the mouth of the inferior portion was conical and sealed by lymph. The other end of the vessel terminated

abruptly in the abscess, a very small crust of blood lying within it. The ulceration was extending in this direction, having destroyed the sheath, dislodged the external clot, and opened the cicatrized extremity of the artery.

From this the fatal hemorrhage issued. Fig. 1. 2. of plate 6, accurately exhibit the contrasted state of the arterial mouths in the preparation.

The deposition of lymph internally and externally is induced by the same inflammation, and takes place at one and the same time, and both concur essentially to the security of the vessel; when therefore the external deposition is destroyed by a supervening ulceration, the security is diminished in the proportion of its importance. Mr. Abernethy mentions a case wherein ulceration extended to the iliac artery from an adjoining lymphatic gland, by which a great hemorrhage was caused while the ligature below remained firm*.

There is yet another and a prolific source of secondary hemorrhage, even where the ligature has done its duty; I mean the direct sloughing or gangrenous inflammation of the arterial extremity. This happens in aneurisms and amputations upon persons of irritable habits; in casualties which deeply shock the nervous system; and occurs most

* Surg. & Phys. Essays, Part III. p. 167.

especially in the wards of crowded hospitals, where gangrene has become contagious.

EXPERIMENT.

Two ligatures were applied on the femoral artery of an ass at the distance of one quarter of an inch, and were immediately cut away. On the following day the thigh was tumid and hot, and the wound soon ulcerated extensively, yielding a copious and offensive sanies. This condition of the parts increased until the fourteenth day, when the animal was killed. It appeared on dissection that the ulceration had extended farther internally than externally, having spread among the muscles and under the skin for many inches above and below the original wound. A clot one inch and a quarter in length was found within the artery, the effect of the obstruction which had been established by the adhesive inflammation. The portion of artery which had been included between the ligatures and the lymph contained in it, and surrounding it, were actually in a sloughing state. Beyond this part the upper and lower portions of artery, which were of a deep red colour, adhered to the clot sufficiently to prevent hemorrhage.

This case shews the destruction of the external bed of lymph, and the precarious security maintained against secondary hemorrhage where the sloughing inflammation has taken place. It might excite surprise that an operation so favourable to the healing of the wound should prove so severe in its effects; but these are to be ascribed to the standing posture of the animal, which, as it is unfavourable to the return of the blood, and requires a constant muscular exertion, carries the inflammation beyond its due bounds, and hurries the adhesive into the ulcerative action, as would most certainly be the case in the human subject under the same circumstances. For this reason the carotid of animals is to be preferred to the brachial or femoral arteries as the subject of experiment.

CASE.

In the year 1804, an athletic man enjoying vigorous health suffered amputation at the thigh at St. Thomas's Hospital, immediately after a compound fracture and laceration of the leg. The arteries were suffered to bleed freely before they were secured*. The stump early put on a very unfavourable appearance, and at the second dressing was in a sloughing condition. For the first five

* See Mr. Hunter's excellent remarks on bloodletting after severe wounds and amputations. On the Blood, &c. p. 564.

days the man had been kept low; after the fifth he had a pint of porter daily. On the ninth day he became delirious, at first through the night only, but after the eleventh the delirium was constant. At this time there was general disturbance of the nervous system with watching, and he muttered and picked the bed-clothes. His pulse, though full, was intermitting. On the tenth he began to take wine and bark freely in addition to his porter. On the twelfth day he lay muttering with his eyes close, and pressed the lids together so closely as to resist every attempt that was made to open them. He was perpetually waving his hand above the bed-clothes. His pulse was 120, full and regular. He retained the power of swallowing, but passed his evacuations unconscious of them. He died at the end of the thirteenth day.

Dissection. The stump was excavated by sloughing, and an inch of bone was bare, but in many places the slough had separated, and granulations and good pus appeared. The ligature on the femoral artery, was so nearly detached that it came away on removing the dressings. There was found on inspecting the artery, a clot of blood which reached to the first collateral branch, and was one inch and a half long. This coagulum did not quite fill the canal of the vessel, nor did it in the least adhere to its internal coat. The lower was smaller than the upper part of the coagulum, for there the artery was not contracted. The truncated extre-

mity of the vessel was open, ragged and sloughy. There was a very little coagulated lymph round the external coat at its extremity, but none within it. The internal coat was of a uniform vivid red colour, and this extended even above the bifurcation of the aorta and some way down the iliac artery of the opposite side. The viscera were all perfect and healthy. See fig. 3. plate 6.

This case exemplifies an accidental advantage to be derived from the internal coagulum of blood. Hemorrhage was prevented only by its extent. The conical shape of the clot and the sloughs lying about the extremity of the vessel, evince that it had been contracted, and had undergone the adhesive process. Had the collateral branch opened at the distance of three or four lines from the extremity of the artery, the clot, which would have been accurately of the same extent, must have been carried away by the torrent of the circulating blood, when from the death of the lymph it became the only remaining stay to hemorrhage.

EXPERIMENT.

The left femoral artery of a large Newfoundland dog was tied with a single ligature. A portion of the sheath and the anterior crural nerve were included in the ligature. Next day the animal was

very lame in his left leg, and his toes doubled under him as he walked. There was no sensible change in the temperature of the limb. On the fifth day a hemorrhage took place from the wound. On the sixth day the dog was ill and refused to eat. On the seventh he was found dead from a return of hemorrhage during the night.

Dissection. A very extensive sloughing of the cellular membrane around the wound had taken place. The artery itself had sloughed at the part where the ligature was applied, and its divided portions had retracted. Each end of the vessel was dead to some distance above and below the slough. See fig. 4. plate 6,

In this experiment an additional cause to the strained position of the limb probably operated to produce the mischief. This was the inclusion of the nerve in the ligature. See the report of a similar experiment by Pouteau*, followed also by fatal hemorrhage.

It would be superfluous to expatiate upon the obvious and important practical lessons which these experiments convey; first, the perfectly relaxed and easy position of the limb after the operation, from inattention to which Petit lost a patient by

* Melanges de Chirurgie, p. 302.

secondary hemorrhage*; and secondly, the application of the ligature to the artery exclusively.

The last narrative calls to my mind the case of a female upon whom Mr. Abernethy performed the operation for a popliteal aneurism. Pain and sickness were experienced after the operation, fever and restlessness came on, and a fatal hemorrhage happened on the third day. Dissection shewed that the whole surface of the wound was in a sloughy and putrid state. The internal coat of the artery was highly inflamed and its orifice pulpy and sloughy†.

Secondary hemorrhage sometimes results from the laceration of the young and tender cicatrix, when the ligature is violently plucked away. Of this I could recite an instance, but it is not to be classed among the natural causes.

The causes which I have enumerated are threefold.

1. Failure of the adhesive inflammation.

2. Diffused and extending ulceration.

3. Sloughing or gangrenous inflammation.

* Mem. de l' Acad. Roy. des Sciences. An. 1732.

† Surg. Obs. on Aneurism, p. 229.

These may be severally induced by many other circumstances than those which I have mentioned. Each admits of being aggravated if it is not occasioned by unskilful operations and ill adapted ligatures.

III. The desiderata in the operation for aneurism, as it is at present performed, are to excite with certainty and rapidity the adhesive union of the sides of the artery; to limit the ulcerative process as much, and to complete it as early as possible.

I have already pointed out the difference in the action of ligatures to accomplish the purpose of their application.

In this country the broad ligature is exploded from reputable surgery*; the ligature in use is round, whether larger or smaller, and two are generally applied at an interval sufficient to admit of

* The surgeons of the Continent are greatly behind-hand on this subject, notwithstanding the indefatigable labours of Professor Scarpa. They clearly do not understand the train of actions set up by the ligature. It is astonishing that so intelligent a person as Scarpa should still practise the sheathing of the artery with linen. He cannot surely know that it is unnecessary to the security of the external coat, and that in twelve hours the vessel would be as well sheathed with lymph which this wadding intercepts, and through which it must work its way by ulceration. Scarpa unfortunately disclaims experiment and holds its results cheap. This ill founded and unphilosophical opinion has materially retarded the progress of surgery, even in this country.

the division of the included portion of artery, after which the extremities retract to a considerable distance within the sheath. When the ligature is applied with but moderate tightness, from fear of injuring the arterial coats, it is liable to be thrown off the divided vessel, an event of which I was once a witness. On this account it was proposed to pass a stitch through the artery to retain it, which if the ligature were lax would not prevent hemorrhage, and was an useless precaution if drawn tight, because in this case it indents the external coat in a groove where it divides the muscular and internal, and thus obtains a firm seat. But I can see no advantage resulting from the division of the artery, and although the practice was introduced upon authority to which I pay the highest respect, the benefit has been rather supposed than proved. If it carries with it no advantage, it is not free from objection. The ligatures must be applied at a greater distance apart than would be necessary if the vessel were left continuous, and the retraction which ensues upon division renders the cavity of the wound larger and the effusion of lymph of necessity greater than it would otherwise be, for this always extends beyond the extremities of the divided vessel*. Even though the external wound is of the full extent required for the convenient application of the ligatures, they will be carried to a distance under the muscles and integuments, and the suppuration which they excite wil

* See fig. 4. plate 7.

be more profuse and more confined, a circumstance of which I have before shewn the evil consequences. If on the other hand two ligatures are applied, and the included portion of artery left to fade, or only one ligature is used, a practice much to be preferred, the extremities, being previously fixed by adhesion to the sheath, will retract very inconsiderably, if at all. I was led to this observation by comparing the appearances of parts in which these different methods of operating had been practised. I tied one carotid of a dog according to the present mode of operating, and the other with a single ligature, and found a remarkable difference in the extent of surface of the wound, the distance of the arterial extremities, and the quantity of lymph shed over and around them.

In addition then to the greater simplicity of the operation; the limitation of the bed of the wound, and the casting off of the ligatures at the point of their original application opposite to it, are advantages obtained by the non-division of the vessel. These circumstances are important, as they limit the suppurative and ulcerative processes to a smaller compass, and quicken the separation of the ligature. To some this last might appear an objection, as it was formerly urged against the tight ligature, under the idea that the adhesion might not be previously established. But experiment proves that a due relation is preserved between the leading and

the subsequent stages of inflammation; the actions are not single and independent, but form a train and go on in harmony with each other, so that the quickness of the ulcerative is only a consequence of a proportionate celerity of the adhesive action. In this respect the actions of inflammation ensuing upon injury are not strictly morbid, for they bear a stronger affinity to the phænomena of health than of disease, and thus we talk of healthy inflammation and healthy pus. A perfect union by the first intention is the best security against slow or spreading ulceration; and the means above explained, by which we secure a perfect union, tend in the greatest degree to make ulceration quick and definite. Formerly lax ligatures were used to retard ulceration, so that by the same means by which ulceration was rendered slow, adhesion was rendered imperfect.

I have been led to these observations, in considering the present method of operating. But it appears to me that the residence of the ligature on the artery stamps an imperfection on the operation for the aneurism, which the facts ascertained by experiment plainly indicate to be remediable. Such is the rapidity of the union by adhesive inflammation, that lymph is in a state favourable for organization in less than six hours in a wound, the sides of which are preserved in contact. And long previous to the appearance of that coagulable lymph which is the medium for the inosculation of ves-

sels, a glutinous exudation from the cut surfaces fastens them together. In my experiments on the intestines of dogs I had many proofs of this, and the same thing has been observed in wounds of other parts. But would the pared edges of a hare lip unite by adhesion, favourably as they are disposed to union when brought in contact, if they were allowed to remain asunder? Certainly not. It occurred to me therefore, that if a round ligature were applied and suffered to remain upon the vessel for a few hours, it would have fulfilled the intention of its application, and by its removal at this period the dangers and inconveniences attending its stay would be obviated. Suppuration, which chiefly results from the irritation of the extraneous body, was never observed in less than twenty-four hours, and very seldom so soon; and although the ulcerative absorption, which sets the ligature free, commences at the period of suppuration, it is never finished in less than eight, seldom in less than fifteen, and often not in twenty days. Now if the opposite lips of the wound in the artery were kept in contact for a time sufficient to ensure their adhesion, suppuration and ulceration of the external coat of the artery would probably never ensue; the artery would be obliterated without losing continuity, and the wound would heal like a simple wound, by the first intention. This reasoning seemed to me plausible enough to justify an experiment or two; I made them, and the following is the report.

EXPERIMENT I.

The right carotid of an ass was exposed by dissection. A piece of coloured twine was laid parallel with the artery and included with it in a round ligature drawn into a single knot. The integuments were then stitched together by an interrupted suture, and at the end of six hours the circular ligature was drawn away by the slip of twine. The animal lost very little blood, although from the depth of the vessel and the condition of the beast it was not completely exposed and secured without a considerable separation of parts. The diary of his life for a fortnight succeeding the operation presents nothing worthy of note. The natural functions went on as before, the wound discharging pus freely. I should observe that the peculiar texture of the integument of these animals causes every wound extending beneath it to suppurate.

In the act of manducation on the day fortnight of the operation, a stream of arterial blood jetted from the wound. I was present and allowed it to continue; it did so for ten minutes or thereabouts, when the animal fainted; it stopped, and did not afterwards recur*. In two days after he seemed to have recovered the loss of blood, and to be as well

* This blood must have issued from a branch opened by ulceration in the cavity of the wound.

as before. The wound was healing. The ass was now killed, and the appearance of the artery upon examination is represented faithfully in fig. 3. plate 7.

EXPERIMENT II.

The carotid of a blood horse was tied, a slip of twine being included in that which formed the ligature as in the preceding experiment. The wound was brought together by a single suture, and the ligature withdrawn by means of the slip in *two* hours. The operation was done at six o'clock p.m. and the animal knocked down fifteen hours after, viz. at nine o'clock of the following morning. The appearances upon the examination of the artery are represented in fig. 1. plate 7.

EXPERIMENT III.

The left carotid of the ass which was the subject of the first experiment, was treated in the same manner as the right had been, except that the ligature was withdrawn at the expiration of *one* hour. Next day the animal was killed, having survived the first operation seventeen days, the second

twenty hours. The appearances of the left carotid are preserved in fig. 2. plate 7.

That the coaptation of the wounded surfaces of the cuticular coat of an artery, if preserved for a short period after the infliction of the wound, renders its obliteration certain, is a fair inference from these experiments. A more extended scale of inquiry, however, is required to establish the uniformity of their results. They afforded evidence that the circulation was arrested, by the absence of the pulse in the artery continuing after the removal of the ligature; and the vessel was therefore concluded to be as impervious as if the ligature had remained upon it. But upon this event I think it would be impossible to calculate with confidence, unless the ligature were suffered to remain upon the vessel for a time sufficient to insure the organised adhesion of its sides. In Jones's experiments, the return of the circulation was invariably ascertained after the removal of the ligature; and he seems to have regarded this as a proof that the subsequent obliteration of the canal was effected by a process independent of the coagulation of the blood. But in all these and similar experiments, the blood, as blood, has no concern in the obliteration of the vessel: the conical coagulum of blood is not formed in the first stage of the obstruction; its formation is gradual, and appears to require a change in the properties

of the vessel consequent upon the abolition of its function. And although the presence of the conical clot satisfactorily demonstrates the obstruction of the canal, it is sometimes very inconsiderable, and at other times deficient, where the obstruction is complete. It is a mistake therefore to regard the coagulum of blood among the immediate effects of the ligature; it is an incidental consequence only of the permanent obstruction which it has been supposed to constitute; without which it never could be formed, nor, if formed, ever be competent to the purpose of permanently obstructing the canal of an artery.

In the materials of this paper I have derived assistance from my friend and colleague Dr. Farre. It would be injustice to myself, as well as to him, to conceal an obligation, which I feel it creditable to owe, and grateful to acknowledge.

SUPPLEMENT

TO THE

NINTH ARTICLE OF THIS VOLUME.

BY SIR GILBERT BLANE, BART. F.R.S. &c. &c.

HAVING at page 121 stated the great advantages derivable to society from vaccination, it gave me concern to find, from a work which appeared while this volume was in the press, that there were reasons, upon new grounds, for questioning whether these advantages were so great, as the evidence in favour of that practice seemed to establish.

Dr. Watt, of Glasgow, the well-known author of a treatise on diabetes, and himself a great promoter of vaccination, brought out a work on Hooping-Cough about three months ago, to which an Appendix is subjoined, consisting of remarks on the relative mortality of small-pox and measles, and affording some singular results. In the course of his researches into Parish Registers, in order to ascertain some points respecting hooping-cough, he found, to his great surprise and mortification, that the number of deaths of subjects under ten years of age had not been diminished since the introduction of vaccination; though the mortality

from small-pox had, for the last ten years, been reduced to a fourth part of what it had been in the preceding ten years. Anxious to discover the cause of a fact so unexpected, he entered upon a laborious examination of all the parish registers of that city, from which it appeared that since the extensive practice of vaccination, ten times more children had died of the measles than formerly, which fully accounted for the stationary state of mortality of those under ten years of age.

On these grounds the author finds himself constrained to infer that there is some change produced in the living system by small-pox, which predisposes it to be affected by the measles in a much milder degree than when they are caught by those who have not undergone small-pox.

This is too serious an inference to be hastily admitted, but in case the researches of others should confirm Dr. Watt's positions, we ought not to shut our eyes against the light.

Vaccination has not been carried to near so great an extent in London as in Glasgow, but as the mortality of small-pox has, on the average of the last ten years, been diminished in the former to almost one half; we may expect some influence from it on the mortality of measles, if Dr. Watt's allegations are founded on nature. With a view

to this, I have put it to the test of an arithmetical statement, as exhibited in the annexed table.

Every reader will judge for himself; I own that I think it will be difficult to account for the great increase of the mortality of measles in the last series of years, as shewn in the table, without admitting the truth of the discovery alleged to have been made at Glasgow. It appears by the London bills that this mortality is more than double of either of the preceding series. And I find, upon inspecting the same bills, as far back as the year 1700, that, during the whole of the last century, the annual mortality from measles exceeded 400 only in seven instances; whereas, it appears by the annexed table, that they have exceeded that number eight times in the last ten years.

It is observable under the column of "Mortality from all Diseases," that there is a diminution of about 14,500 in the last series compared with the former. About one third only of this reduction of mortality can be imputed to vaccination, if the increased mortality of measles is admitted to depend on this; for if the diminished mortality of the former, and the increased mortality of the latter, are brought to account, it would make a diminution of about 5000 only, and it would follow that the diminution of general mortality is principally referable to the increasing causes of salubrity in the metropolis.

We have a farther proof of the improved salubrity, from inspecting and comparing the number of births and deaths. In the course of the last century the burials exceeded the christenings very considerably, particularly in the beginning and middle of it. It was not till the year 1790 that the number of births exceeded the deaths; and this occurred again only twice before the expiration of the century, namely, in the years 1797 and 1799; whereas, in the twelve years of this century which have already elapsed, there appears a majority in favour of the births every year but two.

But, in order to appreciate fairly these statements, it is necessary to ascertain what difference has taken place in the population.

It appears by the parliamentary enumeration of 1801, that the population of the parishes included in the * bills of mortality, amounted to 777,000, and by the enumeration of 1811 to 843,000, making a difference of 66,000.

With respect to the mortality, the increase of population, when taken into account, presents a

* Some of the most populous parishes and the most increasing, such as Marybone and St. Pancras, are not included in the bills of mortality. The population of the parishes out of the bills of mortality, amounted, in 1801, to 123,000, and, 1811, to 162,000. See Parliamentary Report of the National Enumeration for 1811. Part II. p. 199.

still more favourable view of its diminution than the comparison of the numbers in the respective series imports; for, in consequence of this additional population, the deaths would have been increased in the last series by an eleventh part, instead of being diminished, had there not been some counter-vailing causes favourable to human life. If the mortality had been in the same ratio to the population in the series ending 1811 as in that ending 1801, it would have amounted to 213,532, that is, about 19,000 more than it stands in the tables.

With regard to the births, their increase in the last ten years, calculated according to the increased population, would have been 202,560, a number so near to what stands in the tables, that we may fairly impute the difference between the ratio of deaths and births in the last series, compared to the former, to the diminution of the deaths, and not to the increase of births.

With regard to the question before us, I am unwilling to believe that there are yet sufficient *data* to decide finally upon it. Could not these instances of extraordinary mortality from measles, be accounted for by conceiving them to be subject to local and temporary fluctuations, like scarlet-fever, which, in some circumstances of time and place not yet ascertained, is much more fatal at particular periods and in particular districts? An

ingenious friend of mine has remarked to me in conversation, that some light is thrown on this subject by considering that whichever of the epidemic maladies attack children first, it will be the most fatal; inasmuch as all of feeble constitutions will fall in its way, while the stronger will be left to encounter the attacks of the others; and that the small-pox, owing probably to the greater abundance and rankness of their *effluvia*, are generally caught in a casual way before measles, hooping-cough, and scarlet fever, and are therefore reckoned more fatal than any of these. But a new field of research being opened, the numerous readers and contributors to this work will, no doubt, be excited to examine such registers as are within their reach; and also in future to watch in their own practice, whether they find that the majority of the fatal cases of measles have occurred in those subjects who have not undergone the small-pox; also, whether small-pox are milder where measles have preceded them; also, whether there is any difference in the casual and inoculated small-pox, with regard to their influence on measles, and to decide upon other questions which may arise out of this new and important subject. In the mean time, it is necessary to remark, that though this fact should be found to be universally true, it ought not to discourage vaccination; for it appears from what is stated, with regard to this metropolis at least, that though the mortality of measles has been dou-

bled in the last ten years, while that of small-pox has been reduced to one half, yet the absolute number of the latter being much greater, there still remains a balance of 5000 in favour of human life.

The measles is also a disease less loathsome and painful, and is not followed by such serious consequences as the other, such as deformity and loss of eye-sight.

I shall conclude with adverting to some false inferences, which have been deduced from certain abstract principles of political œconomy, tending to depreciate the importance of such questions. For if it is true that population must be limited by the stock of subsistence, and that the physical power of procreation is adequate, not only to uphold population at all times as high as the stock of subsistence will bear; but, from the indefinite extent to which it may be carried, to repair, in an incredibly short time, the utmost ravages of disease; it seems to follow that such a saving of human life as is within the reach of vaccination, or any other medical means, can be of little value to the great interests of society. To this I would answer, that, though I am well convinced that these principles* are founded in truth and nature, and may safely be admitted as maxims of political science; it is,

* See Essay on Population, by Mr. Malthus.

nevertheless, equally well founded in truth and nature as a principle of moral science, that the dependence of individuals on each other is such, that neither social institutions, nor even the human species under any form, could exist without the operation of the kind affections, and of practical beneficence, which are, at the same time, the main constituents of all that is understood by the name of virtue, and of whatever is amiable and excellent in the human character. It seems, therefore, hardly necessary, and almost impertinent, in addressing men of cultivated minds and correct principles, such as those who compose the professions of physic and surgery, to refute the fallacious reasoning above-mentioned; and to remark that it is our paramount duty, and ought to be our unceasing study, to preserve the lives and to alleviate the sufferings of all those who seek our assistance.

*** Since this Supplement was sent to the press, Dr. STANGER, Physician to the Foundling Hospital, has stated to the Society, that he had ascertained by an examination of the records of that hospital, that out of a hundred and thirty-one patients who had undergone vaccination, and had afterwards had the measles, two only had died. It appears from the same records that out of a hundred and thirty-one cases of measles in children, who had previously had small-pox, eleven proved fatal. This evidence is conclusive, to the extent that it goes, that small-pox produces no predisposition to pass through measles in a milder way, and that vaccination has at least no prejudicial influence.

Year.	Deaths from all Diseases.	Christenings.	Deaths from Small-Pox.	Deaths from Measles.	Deaths under 10 years of age.
1783	19029	17991	1550	185	9178
1784	17828	17179	1750	29	8123
1785	18919	17919	1999	20	8519
1786	20454	18019	1210	783	9638
1787	19349	17508	2418	84	8881
1788	19697	19559	1101	55	8307
1789	20749	18163	2077	534	9973
1790	18038	18980	1617	119	8573
1791	18760	18496	1747	156	9093
1792	20213	19348	1568	450	9456
Total	193036	182262	17037	2415	89671

Year.	Deaths from all Diseases	Christenings.	Deaths from Small-Pox.	Deaths from Measles.	Deaths under 10 years of age.
1793	21749	19108	2382	248	9456
1794	19241	18689	1913	172	9441
1795	21179	18361	1040	328	9216
1796	19288	18826	3548	307	10512
1797	17014	18645	512	222	7139
1798	18155	17927	2237	196	8719
1799	18134	18970	1111	233	7645
1800	23068	19176	2409	395	10058
1801	19374	17814	1461	136	8301
1802	19379	19918	1576	559	9176
Total	196581	187434	18189	2796	89663

Year.	Deaths from all Diseases.	Christenings.	Deaths from Small-Pox.	Deaths from Measles.	Deaths under 10 Years of age.
1803	19502	20983	1202	438	8222
1804	17038	21543	622	619	7481
1805	17565	20295	1685	543	8229
1806	17938	20380	1158	530	8256
1807	18334	19416	1297	452	8190
1808	19954	19906	1169	1386	9388
1809	16680	19612	1163	106	7608
1810	19893	19930	1198	1031	9133
1811	17042	20645	751	235	7398
1812	18395	20404	1287	427	8198
Total	182241	203114	11532	5747	81103

The author having been prevented, by a most afflicting event in his family, from duly superintending the press, subjoins the following list of omissions and corrections in the ninth article of this volume.

Page 93, line 21,—after 1679, add, "the period at which it was most prevalent was about the middle of the fourteenth century. In rude ages, habitations and clothing are so simple as not to generate infectious *effluvia*, and in polished ages their bad effects are counteracted by ventilation and cleanliness. The period abovementioned, which may be styled semi-barbarous, is at that distance from both these extremes in which we might naturally expect the most pernicious effects of bodily filth and foul air. Dr. Robertson, in his View of Society, introductory to the reign of Charles V., makes the like remark with regard to the moral habits of mankind."

Page 95.—At the end of the first note, add, "In the expedition to Quiberon, in 1795, several horse transports had their hatches shut for a length of time in a storm, by which means eight horses were suffocated. Those which survived became affected with the glanders soon after they landed. Professor Coleman, of the veterinary college, saw twenty of them under this disorder; a considerable number had been previously destroyed."

Page 99, line 6.—For "three" read "four;" at line 8, *dele* "and," and after "life" add "and the vicissitudes of the seasons." At line 14, add, after "rickets," "the diseases connected with the seasons are either those endemics which occur annually, or those which are aggravated by irregular seasons." In the note, add, after "diseases," in line 7, "such as yellow fever and dysentery."

Page 104, note, line 9.—After "1646," add, "200 persons were condemned and executed for witchcraft at the assizes for Essex and Suffolk, in that year."

Page 105, line 5.—Instead of "the only other," read, "the fourth general head of."

Page 106, line 12.—After "nature," add, "and what is artificial ventilation but an imitation of this?"

Page 108, line 5.—In the note, after "calculation," add, "The mean temperature of this climate may therefore be stated at 51°.

Page 120, line 8.—After "Lunacy," add, "nor of childbed and chirurgical cases." Line 23,—after "practitioners," add, "the like may be said of childbed cases."

Page 122, line 10.—After "vaccination," add, "in the last ten years."

Page 130, line 4.—After 494, let there be a reference to a note, as follows: "See Edinburgh Medical Journal, vol. V. p. 492."

Page 131, line 13.—For "attempting," read, "in my attempt."

Page 136, line 15.—Make a reference from this line to the following note: "This case ought, perhaps, rather to have been stated as a chronic inflammation of the *trachea*. The patient had for many years been subject to tedious intractable catarrhs. The only other morbid appearance was a preternatural density in some portions of the lungs, the cells being filled with a sort of bloody serum. It is evident that expectoration, in such cases, must be very difficult and imperfect, the rigidity of the *trachea* not permitting that diminution of the area of the tube by means of the muscles which constrict it, so as to give a greater *impetus* to the air in the act of coughing. I have lately met with a similar case, but the density of the lungs was more extensive, and seemed

to have a greater share in its fatal termination. It may be remarked that the inner surface of the *trachea* in these two cases, did not, as in acute inflammation, exhibit the exsudation of coagulable lymph, though there was every other character of inflammation."

Page 136, line 18.—*Dele* the whole of this line.

Page 137, line 30.—For "3," read, "1," and for "2," read, "8."

Page 138, line 1.—In the notes, for "two," read, "three," and for "both," read, "all." Line 3, of the same note, for, "they were both," read, "two of these were."

Page 139, line 20.—A reference and note as follows: "Before the period of this series of cases, I met with a case of distinct and severe *Ischuria renalis*, in which electricity was of instant and striking benefit, producing an immediate flow of urine, and effecting a complete recovery. This, I believe, is a very rare disease; I never happened to meet with any other case clearly characterised." Line 26, for "0," read, "1."

Page 140, after line 25, insert a line expressing one case of spontaneous gangrene which proved fatal.

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EXPLANATION OF THE PLATES.

Plate I. *fig.* 1 *and* 2. The cyst removed from the orbit by Mr. Barnes; and the point of its attachment to the bone. See p. 320.

fig. 3 *and* 4. The saw employed by Mr. Wardrop in removing part of a metacarpal bone; and the portion of bone removed. See pp. 312 and 313.

Plate II. exhibits the different textures of cataract described in Mr. Travers's paper, page 278. Excepting *figures* 7 and 10, the pupils are dilated by Belladonna.

fig. 1. A lenticular cataract, opacity central with small nucleus; transparent capsule.—Double.

fig. 2. A lenticular cataract; opacity equally diffused; transparent capsule.—Double.

fig. 3. A lenticular cataract; opacity diffused, but of unequal density; transparent capsule.—Single.

fig. 4. A lenticular cataract; opacity central and radiated; transparent capsule.—Double. The cataracts represented by *fig.* 1 and 2. were congenital, and the subjects of them children. The subjects of *fig.* 3. and 4. were young adults, who had enjoyed distinct vision. They were all of soft consistence, and were readily broken into flocculi by the gentle but repeated motions of the needle.

fig. 5. A lenticular cataract; of doughy or caseous consistence, having a greenish yellow tinge

in the centre, where the opacity, though diffused, is most dense. Transparent capsule.—Double.

fig. 6. A lenticular cataract of the most dense and compact texture; opacity diffused, having an unusually deep tinge of a reddish brown color.—Double.—The amber color is more frequent, denoting a similar consistence. The subjects of these cataracts were full-aged men. In both eyes the cataract, *fig.* 5. was couched, and that represented by *fig.* 6. extracted from both eyes, with perfect success.

fig. 7. A tough membranous cataract, lens absorbed; iris adhering and drawn inwards, though the pupil is of full size and but slightly irregular.

fig. 8. An opaque capsule containing a thick milky fluid, and behind it, a portion of solid lens.

fig. 9. An opacity of the capsule of the vitreous humor, seen through the transparent lens, of a crescent shape; radii proceeding from its convex side towards the circumference of the lens.

fig. 10. A central capsular opacity.—Pupil contracted and deformed by adhesion of the iris. The subjects of the cataracts represented by *fig.* 7, 8, 9, 10, were adults. To the cataracts, *fig.* 1, 2, 3, 4, 8 and 10, the operation with the needle is exclusively applicable.—To 5 and 6. decidedly inappropriate. In 7, though fairly entitled to trial, it is often ineffectual from the toughness of the membrane and the elasticity of the iris. For the cataract, *fig.* 9, it is questionable if any operation would prove a remedy.

Plate III. *fig.* 1. A section of the uterus, shewing the effects of its natural contraction after delivery in compressing the blood-vessels.

a. a. b. b. The orifices of the larger blood-vessels flattened and compressed, so that they are with difficulty recognised.

c. Outer surface of the uterus covered with the peritoneum.

d. Cavity of the uterus.

fig. 2. A portion of the uterus in a relaxed state, to shew the size of the blood-vessels. It is however to be observed, that the great veins of the pregnant uterus are not circular; they are flat, as appears by the wax injections; the arteries preserve their usual form. But when the vessels are compressed by the natural action of the muscular fibres, at the same time that their inner coats are kept together, their mouths are pursed into a triangular form. The muscular fibres pass obliquely betwixt the blood-vessels; this gives to them a power of compressing considerably greater than if they were formed like the meshes of a net through which the blood-vessels passed, which is an idea supported by some teachers.

Plate IV. represents appearances of stomachs mentioned in Dr. Yelloly's paper, article 23, page 371.

fig. 1. represents a portion of the stomach of the dog, described in page 415, at the cardia. The lighter part exhibits a portion of the Œsophagus.

fig. 2. represents an appearance of vascularity in the villous coat of the stomach of a man, who had been long affected with chronic catarrh, and died with œdematous legs, and slight effusions of water in the thorax and abdomen. There had been no particular affection of the stomach. Nearly the whole inner surface of that viscus was covered with vascularity, very similar to that represented in the plate.

fig. 3. represents an appearance found near the pylorus of a man, who was much emaciated, and in whom considerable marks of recent inflammation were seen in the right side of the thorax, where the lung was much compressed, was very tubercular, and had many of the tubercles in a state of suppuration. There had been no particular affection of the stomach. The vascular part of the engraving represents a portion of the villous coat, close to the pylorus, with veins seen very faintly beneath, from which the vascularity proceeded; and the whole stomach exhibited a similar appearance. The lighter portion represents a part of the ring forming the pylorus.—It is seldom that the vascularity is so minute, and so distinct.

If the author had earlier determined on laying before the Society any drawings of the appearances described by him in his paper, he might have obtained representations, which would have been, in some respects, rather more illustrative. It is, however, exceedingly difficult, when a very proper in-

stance occurs, (which cannot at all be anticipated) to obtain a drawing of it, by a proper artist, before the appearances are lost; because such drawing must be made, not only on the same day, but by daylight.

fig. 4. represents the appearances observed in the stomach of Nicholson, the murderer, and described at p. 380. The portion from which the drawing was made, was situated near the cardia, and towards the lesser curvature. The darker parts are those mentioned as having a portion of coagulated blood adhering to them.

Subsequent to the printing of his paper, it was suggested to the author, by Mr. Astley Cooper, that it would be desirable, in order to render the observations more decisive, which were made at pp. 400 and 404, relative to the injection of the minute arteries of the great end of the stomach, when the villous coat is extremely thin, to inject that part by the splenic artery, instead of trusting to the superior coronary, and its anastomoses, for sufficiently filling its vessels. He therefore injected the arteries of the stomach of a person, who had died of pulmonary consumption, in the presence of Mr. Cooper, in the following way; the stomach having been taken out, with the cœliac artery, the spleen, and a part of the pancreas attached to it.—After putting a ligature round the cut end of the pancreas, the trunk of the

cœliac artery was divided, and a pipe was fixed to the splenic, and another to the superior coronary artery. A considerable incision was then made through the pylorus, in the anterior part of the stomach, and the stomach, with the spleen, &c. attached to it, were inverted through the opening. The cardiac orifice was then tied, the pipes brought out at the opening in the anterior part of the stomach, and a ligature placed at this part, close to them. The injection (made of calves-foot jelly, coloured with smalt) was then thrown into the splenic artery, when the vessels of the great end of the stomach were immediately filled, and in many places to great minuteness, but without extravasation, except occasionally from rupture. The same process was repeated with the coronary artery, and with the same success; there not being, in either case, an escape of the injection from the minute extremities of the injected arteries. Where extravasation occurred, it was mostly in larger branches, near the pipe; or into the cellular substance, separating the villous and the muscular coats.

The stomach on which this injection was made, was more extensively thin, at its left extremity, than any which Mr. Cooper or the author ever saw. The coats were at this part so thin, as to be nearly transparent, and to admit most readily of reading letters on a dark surface, through them. An oval portion, similar in size to all those of which the weights are given in the

body of the paper, and taken from a part into which the injection had not run, weighed $5\frac{1}{2}$ grains, of which the villous coat, dissected from the muscular, weighed not quite one half. The other parts of the stomach were not thinner than usual; for a similar oval portion, taken at about the distance of $3\frac{1}{2}$ inches from the pylorus, towards the greater curvature, and which was excluded by the ligature from the injection, weighed $23\frac{1}{2}$ grains, of which the villous coat weighed 9 grains, and the peritonæal and muscular together, 14 grains; there being always a loss of from $\frac{1}{2}$ a grain to a grain, or rather more, during the dissection. The veins of the stomach pretty universally contained blood; and when the blood was pushed back in them, an injection of their most minute ramifications took place, without extravasation, even at thinnest parts, in a way similar to what has been mentioned in the body of the paper.

Plate V. *fig.* 1. *a.* Iliac artery.

b. Internal iliac artery.

c. Epigastric artery.

d. Internal pudendal artery.

1. Aneurismal sac.

2. Iliac artery obliterated.

3. Obturator artery.

4. Branch to the obturator.

5. Branch from internal pudendal artery to the obturator.

6. Branches of communication between the ischiatic artery and profunda.

7. Obliterated femoral artery.

8. Femoral artery not obliterated.

fig. 2. *a.* Gluteal artery.

b. Ischiatic artery.

1. Communicating branches of the gluteal artery.

2. Communicating branches of the ischiatic artery and the profunda.

3. Branches of the profunda.

fig. 3. *a.* Aorta.

b. Iliac artery.

c. Arteria profunda.

d. Enlarged branch of the profunda.

1. Communicating branch of the gluteal artery.

2. Communicating branches of the obturator and internal circumflex arteries.

3. Communicating branches of the ischiatic artery and profunda.

4. Femoral artery open.

5. Femoral artery obliterated.

6. Aneurismal sac.

Plate VI. *fig.* 1. represents the arterial extremities in the abscess of the ham, in the case of Ann Mould.

a. a. a. The ragged internal surface of the abscess.

b. b. The inferior portion of the artery, exterior to the abscess, cut open, in which the obliterating process was nearly completed. The dark line is the artery, the white line the sheath, and external to it is the investiture of lymph, on which the

letters *b. b.* are placed. Following the arterial tunic to its extremity, which has been dissected from its sheath, it will be seen to be united by lymph to the *convercle* or external clot of blood—behind which, and within the vessel, is the *bouchon* or internal clot of blood.

c. c. The extremity of the superior portion of artery within the abscess. It is undermined by ulceration, and terminates abruptly with a retorted margin.

d. A crust of blood lying within the extremity of the artery *c. c.*, and by which it appears to be closed; but this feeble covering seems to have been formed only by the last drop of blood, which, *in articulo mortis*, clotted within the patulous mouth of the artery.

fig. 2. shews this portion of the artery *c. c.* slit open.

Compare the truncated appearance of its mouth with the cone-like termination of *b. b.*, in which the adhesive process had been undisturbed. Within it is seen the thin and fragile crust of blood mentioned in the description *d.*

fig. 3. the femoral artery cut open, of the man who died at St. Thomas's Hospital. The internal clot of blood is seen tapering to its extremity, which proves that the artery had at first acquired its proper cone-like termination; until the inflammation passed into the sloughing stage, and the lymph, which had united the mouth of the artery, perished. The length and size of this clot, de-

pending merely on the distance of the collateral branch, was the temporary security against secondary hemorrhage. Below the clot appears the ragged margin of the vessel, and loose sloughs are seen around it.

fig. 4. the femoral artery of the Newfoundland dog, who died of hemorrhage on the seventh night. A portion of the ligature is seen in the interspace of the arterial extremities, which terminate in thin or broken margins, presenting no traces of the effusion of coagulable lymph, or of the existence of an internal clot of blood.—This drawing well exhibits the extensive and complete destruction of the vessel by gangrene, above and below the ligature. See Exp. p. 454.

Plate VII. The drawings are arranged in reference to the period of time, for which the animals were permitted to live after the operation.

fig. 1. The carotid of a horse which was tied for two hours. The animal was killed fifteen hours afterwards. See Exp. 2.

fig. 2. The left carotid of the ass, which had been tied for one hour, the animal having survived twenty hours. See Exp. 3.

fig. 3. The right carotid of the same animal, which had been tied for six hours, a fortnight previous to its death. In these figures, the contracted part of the vessel marks the situation of the temporary ligature; and in each of them the tube is obstructed at that part by lymph. See Exp. 1.

fig. 4. Exhibits the most favourable appearance of a wound on the sixth day from the operation of tying and dividing the artery. The lymph, it will be observed, which forms the bed of the wound, is continuous with the upper and lower portions of the artery, the extremities of which it almost conceals from the view. Contrast it with *fig.* 4. of *plate* 6, and the manner in which the adhesive inflammation protects the extremities of the artery, will be perfectly comprehended.

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Fig. 1.

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Fig. 10.

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Fig 1.

Fig 2.

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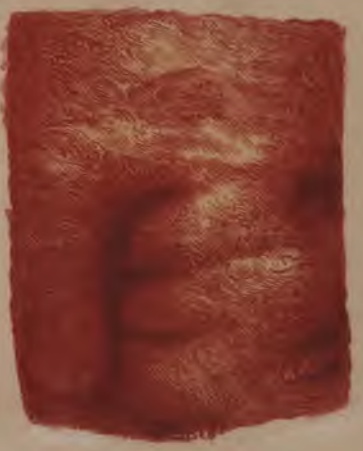

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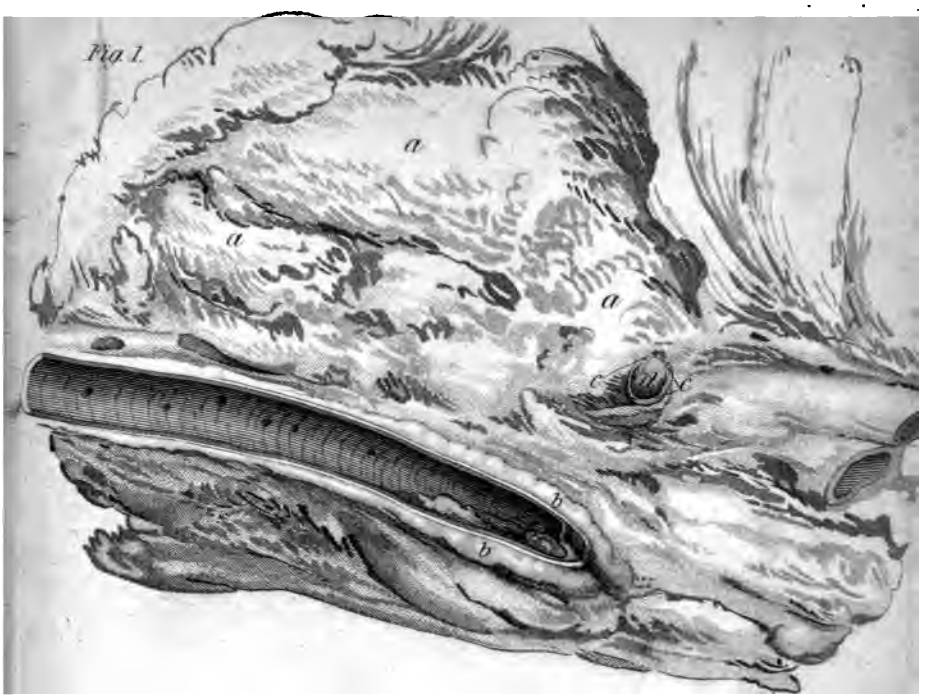

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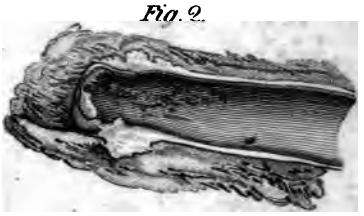

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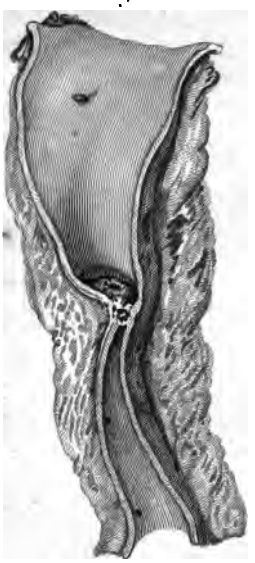

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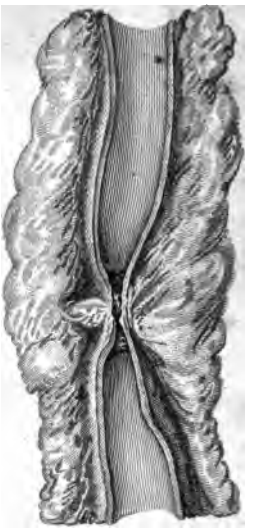

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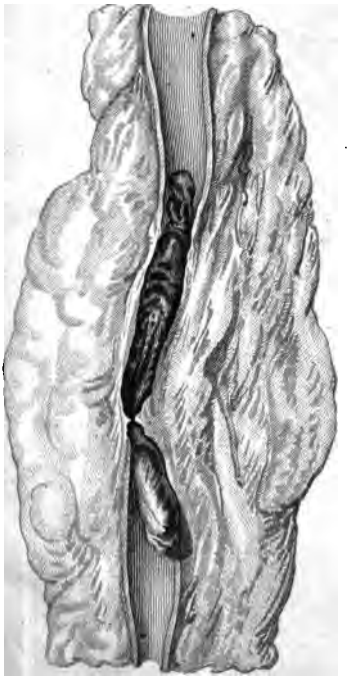

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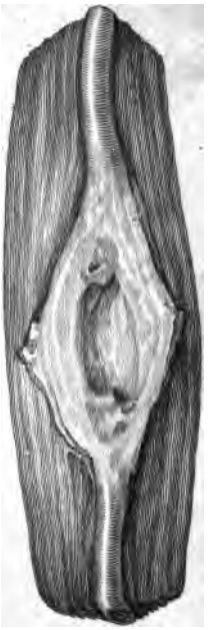

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